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The Ability of the Young Research Worker

THE fact that the progress of the chemical industry tomorrow will be due to the research of to-day is widely recognised and its truth can no longer be questioned. It follows that the qualities of the research worker himself will be a deciding factor in the future prosperity of the industry. It is difficult to name all the qualities which should be possessed by the ideal research man, but it is certain that originality in thought and ideas, with the ability to work out those ideas on his own account in the laboratory, are among the most important.

The opinions occasionally expressed by industrial chemists that the young research workers leaving the university are seriously lacking in just these most important qualities are therefore disturbing and deserve serious consideration. Whether these opinions are true or not, it is clear that the root of the matter lies with the universities. While there can be no standardised " training " for research, the student intending to take up this kind of work should be encouraged to think for himself and to work out original ideas, in brief become " research-minded," as early as possible in his career. There can be no doubt that the university authorities have an extremely thorny problem before them.

Before the war the university course in chemistry lasted three years and to-day it occupies exactly the same time. In the interval there has been an enormous increase in our chemical knowledge, much of it fundamental, so that the student is faced with an almost terrifying mass of data which he must absorb and digest. The position is relieved to a certain extent by the teaching of chemistry in schools at an earlier age than formerly, and by concentrating the university chemistry course, relegating subsidiary subjects, such as physics and mechanics, more into the background. Even so the time at the student's disposal is all too short; he can do little more than attempt to understand and memorise as much of the subject as he is able.

On graduating he may decide to devote a year or two to research work at the university, this decision is not actuated, in the majority of cases, through a problem which he has stumbled upon, and which he feels he must investigate, but rather by the enhancement of his qualifications by the possession of a higher degree; a procedure which commends itself at times when the supply of chemists tends to outdistance the demands of industry. Thus, on commencing research under the direction of a member of the university staff he rarely suggests suitable problems for the proposed work. Nor is he wholly to be blamed for this lack of ideas. As has already been explained the conditions of study have not been conducive to original thought; but, further than that, he wants to do the type of research work which is most likely to give him the results sufficient for a higher degree, otherwise he feels he will be wasting his time. And who knows better than the university staff the type of research most fruitful for this purpose?

If it is true that the present-day young research man has not the *flair* for research already well-developed on entering industry, neither he nor the university can do much in the way of a remedy. But the investigation of a problem, even if the subject is suggested by someone else and carried out under his direction, must call for individual ingenuity in overcoming the small and subsidiary difficulties related to the main problem which must inevitably arise. The young investigator can form some idea whether he himself has that ingenuity and whether he feels fitted for research later in industry.

It would appear that the only way of ensuring that higher degrees are awarded solely on research abilities (thus encouraging the development of those abilities and informing the industrialist what those degrees stood for) would be by judging research on its merits rather than on its results. Additionally, the research problem would have to be one which the candidate for the higher degree had set himself and the methods used in tackling the work would be the criterion of the award, whether, the results obtained were positive or negative. If it is assumed that this suggestion is practicable, it might result in a decrease in the amount of academic work so valuable to industry, and again, still earlier specialisation in education might leave more time for original thought, but it might not have such desirable consequences in the long run. These are in the forefront of the many issues which would have to be decided. The situation will become slowly worse as time goes on, and if it is not of serious importance at the moment it may become so.

Modern chemical processes generally arise from systematic research and science is essential in every step of their development. . . . It is becoming more and more necessary that industry in this country should be research-minded. Much has been accomplished in this direction during the last few years, but research must be prosecuted more and more if we are to keep our place in the forefront of industrial nations.

—Lord McGowan.

Notes and Comments

Refugee Scientists

REPORTS of the summary dismissal from their posts and expulsion from the country of a number of scientists on the continent arouse the deepest sympathy. Apart from the tragedy of financial damage, loss of employment and the severance of all personal connections, the scientist's work is brought to an abrupt end; no doubt often in the middle of an important investigation. Over and above the humanitarian wish to aid these refugees, there is also the very good reason of affording them the facilities for completing their work, the results of which might otherwise be lost to scientific development. From practical considerations alone, therefore, the admittance of refugee scientists to this country would in some cases be advantageous to our technical progress, but the position of the British scientist must not be forgotten. An influx of foreign scientists would have a definite, though it may be small, effect on his employment. It has been announced that the Association of Scientific Workers is to undertake a national inquiry into the unemployment of scientific workers in this country in order to determine the magnitude of this effect. This will be a valuable survey but a start could be made if the foreign scientists were offered temporary accommodation at the universities with opportunities for continuing their work.

Vitamins in Fish Oils

EXPERIMENTS on the molecular distillation of fish oils carried out by the Eastman Kodak Co. show that, besides glycerides and traces of hydrocarbons, they contain free fatty acids, a yellow substance sometimes mistakenly described as vitamin A, and large quantities of cholesterol. The oils all contain varying quantities of vitamins A and D, either in the form of free sterol or combined as esters with the fatty acids. A good cod liver oil contains not more than 1 per cent. of free vitamin A, the rest being in combined form. The esters are very much more stable than the free sterol, so that a concentrate produced by molecular distillation is more stable than the product obtained by saponification and is, moreover, practically free from the other constituents of the oil. A plant is being constructed in America by Distillation Products, a subsidiary of Eastman Kodak, for producing vitamin A in ester form by the molecular distillation process. It is interesting that although no second form of vitamin A has been found it has been possible to say, from its behaviour during distillation, that vitamin D consists of at least five substances. This is the probable explanation of the different potencies of the vitamin derived from different sources.

A New Moulding Material

LAMINATED materials produced from synthetic resins and fabric are already known to possess a high tensile strength, combined with lightness, and have accordingly found useful application in aircraft construction. A new moulding material, giving a very strong finished product of a similar type, is described in the current number of *British Plastics*. In production, a certain amount of fibrous material is incorporated with an alkaline dispersion of A-stage thermo-hardening resin, together with dyestuffs and other ingredients to give the product desired characteristics. This emulsion of resin is then mixed with fibre pulp and the resin is precipitated on to the fibres, which are then converted to sheet form by the usual paper-maker's process. The sheets thus obtained contain 45 to 60 per cent. of resin, and are soft enough to be fitted into moulding presses. They are heat-hardened during the moulding process at a temperature not over 155° C. and pressures of the order of 3 to 6 tons per square inch must be applied. Although the material is more difficult to mould than the usual powders, and costs 50 to 70 per cent. more to produce, its use in industry is said to be assured by its very high tensile strength, which is claimed to exceed that of any other plastic material so far produced. The tensile strength is 22,000 to 26,000 pounds per square inch, and Young's modulus is 2×10^6 pounds per square inch. It can be used for making gear wheels and cogs.

A Suggested Method of Increasing Exports

THE Federation of British Industries in its recent memorandum to the President of the Board of Trade, commented upon in last week's issue, expresses concern at the United Kingdom's large adverse trade balance which it is thought is most likely to continue unless some definite remedial action is taken. Accordingly, the Federation in its memorandum examines the available means of correcting the position and suggests a method likely to prove the most effective. Both the methods of employing the nation's capital resources to meet the deficit and of restricting our imports can be dismissed as undesirable. The remaining method, that of increasing exports, has been under consideration for some time past and, as shown in the Van Zeeland report, general international action has been deemed impracticable for the present. The other way of increasing exports is by means of bilateral negotiation. In these negotiations the Federation suggests that the United Kingdom should insist on reasonable reciprocal purchases by a country to whom she is prepared to grant most-favoured-nation treatment. The institution of a three-column tariff is proposed, the highest column being imposed on the goods of any country to which the United Kingdom was no longer prepared to grant most-favoured-nation treatment. This, however, is a drastic measure appropriate to an emergency. Whether the matter is so urgent can best be judged from the Board of Trade's reply.

Chemical Trade in New Zealand

NEW ZEALAND is not a leading industrial country but the progress of its chemical industry during the last year followed the main trend of other countries with production, imports and consumption of chemicals and allied products showing signs of expansion greater than in any year since the period of economic depression of 1930-34. According to the American Consulate General at Wellington there was a marked increase in the use of fertilisers and insecticides, followed by increased imports of phosphates and sulphur, and a larger demand for paints and varnishes was created by activity in the building trade. The total value of the output of principal chemical products (of which fertilisers comprise about half) made in New Zealand exceeded that of the preceding year by 16 per cent. and imports of the same class of goods were up 25 per cent., according to preliminary figures. Among the most important chemical products imported by New Zealand are paint raw materials, sulphur, medicinals, insecticides and disinfectants, alkalies and soap. Of these about 75 per cent. was supplied from Empire countries in 1936, the latest year for which full details are available. Exports of chemical products from New Zealand are not of great importance; kauri gum and casein accounted for 81 per cent. of the total in 1937.

The Laboratory in the Dyeing Industry

By
D. A. MARTIN

FIFTEEN or twenty years ago, in all but the largest of dyeworks, a laboratory was practically unheard of. To-day the general outlook in most branches of the dyeing industry has changed substantially, but there are still a surprisingly large number of firms, spread over the entire industry that not only have no laboratory, but that still employ "rule of thumb" dyers. It is not intended to decry "rule of thumb" dyers—on the contrary they are extremely experienced and capable men—they have to be—but rather to point out that the methods they employ are obsolete, wasteful, and inaccurate, as opposed to those of the scientifically trained colour chemist. By inaccurate, the implication is that a rule of thumb dyer cannot, with any degree of accuracy, undertake to produce the same shade two days running.

The aim of this article is to point out the advantages gained by using a laboratory in colour production, together with an explanation of modern dyeing practice, and some of the more usual tests applied in colour analysis.

A Matter of Primary Importance

The position of the laboratory in any dyeworks is of primary importance, as it is essential that it should have a true north light and yet be in easy access of the various dyeyards. The equipment need not be a very expensive item. Apart from the usual reagents and glassware, a daylight lamp is very necessary. It is advisable to have the lamp in a cabinet, or preferably in a small dark room leading off the laboratory so that at any time of the day shades may be matched in the daylight and then under the daylight lamp. By this means it is soon possible to gauge the inaccuracies of the lamp—a most necessary requirement in the winter months. As some shades change very much in artificial light it is a very good plan to have an ordinary electric light bulb alongside the daylight lamp for further comparisons.

A really good balance is an essential item. A microscope with low to medium magnification is very useful for colour analysis, and an experimental water bath will be found much more useful than trying to carry out work in beakers over a bunsen flame. A rectangular bath with a lid perforated to take eight or twelve long form beakers is most practicable. For dyeing cotton and viscose mixtures, where a boiling or almost boiling liquor is necessary, the bath must be filled with a calcium chloride or sodium chloride solution, but for materials requiring only a moderate temperature, water will be quite sufficient. This is a rough description of the more general apparatus required.

As to the uses of such a laboratory, they are of course legion. Apart from testing sample dyestuffs, textile auxiliaries, etc., where time allows a laboratory dyeing should be made of any fresh or new shade sent in by a customer—in some cases it being advisable to analyse a small piece of the pattern when there is any doubt as to how it has been dyed. The laboratory is also very useful in determining the reason of any faults that may arise in processing and discovering a method of eradicating them.

Modern dyeing practice is chiefly concerned with being able to produce any given shade at will, and what is far more important producing the same shade exactly, over and over again. To do this, the following items must be taken into consideration—the percentage formula, including the strength of the dye solution, and the liquor ratio.

The percentage formula expresses the relation of dyestuff to material, and is written by the following symbols:—

$\frac{W \times R}{S} = D$; where W represents the weight of material to be dyed, R is the percentage shade required, S the strength of the dye solution, and D the amount of dyestuff to be used. For the purpose of calculation, all dyestuffs in the state in which they are sold (usually powder form) are considered to be 100 per cent. strength. Now in laboratory practice the same method naturally holds good, with one exception. Sample dyeings are usually carried out on not more than ten grams of material. If, therefore, the dyestuffs were used in full strength infinitesimal amounts would frequently have to be weighed out, with rather questionable accuracy. To overcome this, stock solutions are made up, usually in 0.2 per cent. solutions, this strength being a convenient one for laboratory use.

To obtain this strength solution, 0.5 gram of dyestuff is accurately weighed out and dissolved in 250 ccs. of boiling water, preferably distilled. Assuming, therefore, that it is desired to produce a 0.25 per cent. shade on 10 grams of material:— $\frac{W \times R}{S} = \frac{10 \times 0.25}{0.2} = 12.5$ ccs. By this method it is possible to reproduce shades with great accuracy, always allowing that the material is the same, provided that the liquor ratio is taken into consideration. Liquor ratio is the relation of the percentage shade required to the weight of the material and is governed approximately as follows:—light shades of a percentage not greater than 0.5 per cent., liquor ratio 60: 1—medium shades up to 2 per cent, liquor ratio 40: 1—and heavy shades over 2 per cent. liquor ratio 20: 1. It is impossible to lay down any hard and fast rule regarding liquor ratio, but the important point to remember is never use a liquor ratio in the laboratory that cannot be used in bulk, and always keep the liquor ratio constant for any given shade. In order to reproduce an exact matching of a shade it is not sufficient merely to work out, by the percentage formula, the amount of dyestuff required—the liquor ratio must be exactly the same.

The Chief Aim of the Dyeworks

An important part played by the laboratory is, as already mentioned, the testing of dyestuffs. Actually this covers rather a wider field than would be imagined. A dyeworks chief aim is to meet the customer's requirements regarding fastness properties, etc., as well as giving them good matchings. Although all the dyestuff manufacturers issue pattern cards of their dyestuffs together with fastness tables of each dye this is not in itself sufficient, as by far the majority of colours are dyed with mixtures of two or more dyes. Regarding the mixing of dyes great care must be taken over the selection of dyes, as only those of more or less equal drawing powers (affinities for the fibre) should be used in conjunction with one another. The question of drawing power is of most importance when dyeing mixed fabrics such as cotton and viscose, etc. If, to produce a green, a blue and a yellow are used, and the blue has greater affinity for cotton than the yellow, it is impossible for a solid shade to result.

The two main fastness properties that are generally required are fastness to light and fastness to water. Testing for fastness to light is naturally a somewhat lengthy process unless a Fugitometer is available. In testing for water fastness, the sample is wrapped up with a piece of white cotton material and immersed in a small jar of water for twenty-four hours, after which time it is removed and the amount of stain on the cloth noted.

As it is often of great value to be able to determine in what manner a pattern has been dyed, a few of the more simple tests will be given for wool and cotton.

Wool.—If the sample bleeds in boiling water, and even

more so when an addition of sodium sulphate is made, and also produces no ash on combustion, acid dyestuffs have been used. If on the other hand there is no ash on combustion, very little bleeding either in boiling water or on the addition of sodium sulphate, but considerable bleeding on the addition of soda ash, the more expensive and faster type of acid dyestuffs have been used.

Direct colours can be detected by the rather duller shade of dyeing produced, compared with acid colours, absence of ash on combustion and extensive bleeding in boiling water on the addition of soda ash, sufficient to tint white cotton. Practically no bleeding in boiling water, even with the addition of soda ash, and greenish brown ash on combustion indicate chrome colours.

Basic dyestuffs produce very bright shades, which bleed badly in boiling water, much more so on an addition of sodium sulphate—sufficiently to stain mordanted cotton—and produce no ash on combustion. Vat colours produce no ash on combustion and are very fast to boiling water and soda ash. After the addition of hydrosulphite and soda lye there is a strong change of colour, which colours the solution. This solution will regain the original shade if spotted on to filter paper.

Tests on Dyed Cotton

Cotton.—A sample which bleeds in boiling water, more so with the addition of soap, and is greatly increased by the slight addition of soda ash, and gives no ash on combustion indicates direct dyestuffs dyed direct. A sample which produces no ash on combustion, bleeds only slightly on the addition of soda ash, can be discharged to white with hydrosulphite, without the colour returning on spotting the solution on to filter paper, has been dyed with direct dyestuffs that have either been diazotised and developed with paranitraniline or after treated with formaldehyde. Direct colours are sometimes topped with basic colours to obtain great brightness and these can be detected by being stripped to a marked degree in boiling glacial acetic acid and alcohol.

Sulphur colours are fairly simple to detect by boiling the sample in a test tube with a solution of hydrochloric acid and tin salt. A piece of lead acetate test paper held in the steam will indicate the presence of hydrogen sulphide. The sample will appear lighter in shade, but return to its original shade after rinsing and oxidising—either in the air, or by the use of hydrogen peroxide. If the dyeing has been after-treated with metallic salts, such as chrome or copper, a blackish green or brown ash will be produced on combustion. Some vat colours contain sulphur and give the above reaction with lead acetate paper, but they are fast to calcium chloride, which sulphur colours are not.

Basic colours give a white ash on combustion and, of course, very bright dyeings which are fairly fast to boiling water, but bleed strongly on the addition of glacial acetic acid. No ash and strong bleeding in boiling water would point to basic colours dyed without first mordanting, but this is rather a rare occurrence.

Although this is by no means a complete series of tests, it is fairly comprehensive and covers the usual requirements.

Synthesis of Vanillin

A New Process of Russian Origin

A PROCESS for the synthesis of vanillin and other oxyaldehydes that, after detailed laboratory investigations, has been confirmed on the experimental plant scale, is described by N. I. Volynkin (*Zhurnal prikladnoj khimii*, 1938, *11*, 423). Pure vanillin may be synthesised by this method in 1½ to 2 hours, the yield being 85 per cent. of the phenol used.

When investigating the synthesis using nitroso compounds for the preparation, the author observed that the output was higher when the glass vessel in which the process was generally carried out was changed for a copper vessel. Acting as a reducing agent, the metal, especially in powder form, can replace the second molecule of formaldehyde necessary for the reduction. Since the latter is condensed easily with phenols at lower temperatures, but hardly oxidised by nitroso compounds, the synthesis of oxyaldehydes prepared according to the nitroso method must be carried out at 50° to 60°.

Owing to the higher temperature and to the excess of formaldehyde necessary for the reaction, phenol-formaldehyde resins are formed, the yield of vanillin being thus reduced.

It is, however, possible to carry out the synthesis at considerably lower temperatures if metals (for instance, aluminium) are used as reducing agent, and the amount of the formaldehyde is decreased to the theoretical. In this case less resins are formed.

In order to weaken the reaction and to increase the concentration of phenol, being both influenced to a large extent by the acid, necessary for the condensation and for the evolution of hydrogen, the author recommends alcohol as solvent.

Laboratory tests showed that formaldehyde in alcoholic solution must flow during the whole process into the phenol, with stirring. The necessary amount of metal powder must be added in small portions. The product of the reaction is diluted with water, and the oxyaldehydes obtained are extracted either with benzol or toluol. Liquid is then pressed from the vanillin at 100 to 400 kg. per sq. cm.

Vanillin synthesised from guaiacol and refined by this method possesses no secondary odour. The melting point rises from 80-81° to 83°, and even to 84°, when the crystals, after being moistened with alcohol, are treated three times in the above-mentioned way. Experiments on a pilot scale plant include the manufacture of vanillin and vanillal from 5 to 25 kg. of guaiacol. To a mixture containing alcohol, hydrochloric acid and nitroso-dimethylaniline was added gradually a mixture containing guaiacol and formaldehyde, as well as aluminium powder. The results showed that the output is decreased to 50 per cent. when working without alcohol. By changing guaiacol for either guethol or phenol, vanillal and salycilic aldehyde are obtained.

Letter to the Editor

The Cost of Travelling to Exhibitions

SIR,—I observe that attention is being directed to the cost of travelling to exhibitions such as the splendid Empire Exhibition now being held in Glasgow, compared with the much lower rates available to those attending exhibitions on the Continent.

It would be unjust to all concerned if the considerable concessions available to overseas buyers attending our own British Industries Fair were to be ignored in this connection; indeed, I think they should be emphasised.

European visitors to the British Industries Fair this year, whether travelling by rail, ship or aeroplane, could secure fare concessions ranging from 10 per cent. to as much as 50 per cent. All Continental railway companies, with the exception of those of Norway and Sweden, offered reductions of from 10 per cent. to 50 per cent. in the cost of return tickets to London, and in some cases through to Birmingham. Single or return tickets at a reduction of 10 per cent. were offered by the leading British and European airway companies, and return tickets at substantial reductions were issued by the shipping companies serving the Scandinavian and northern European routes to England. In addition, the British railway companies offered return tickets to London or to Birmingham to travellers from Continental ports served by British railway steamship services at reductions of roughly 33⅓ per cent.

These concessions show the importance with which Europe now regards our Fair, and should not, I feel, pass unnoticed in the present discussion.

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The Potato Marketing Board Inquiry

Evidence in Favour of Granting Powers to the Board to Manufacture Chemicals

THE Potato Marketing Board commenced their evidence in favour of proposed amendments in their powers, in an inquiry at the High Courts, which was resumed on July 22 before Mr. Charles T. Le Quesne, K.C. The Board are seeking wider powers to manufacture potato by-products, including alcohol, synthetic organic chemicals from ethyl alcohol, and plastic and synthetic resins for use in the moulding, varnish and paint industries. This particular amendment was strenuously opposed on July 15th by Mr. Davidson Pratt, general manager of the Association of British Chemical Manufacturers, who also spoke for the plastic industry. He contended that the P.M.B. should seek co-operation with existing highly organised and technical industries, rather than embark upon the field of production themselves, with inevitable loss which would have to be met by potato producers. (Extracts of his evidence were published in last week's issue, pages 65-67).

No Financial Resources

Capt. John Mollett, the chairman of the Potato Marketing Board, said that the Board had never set out to corner potatoes. Such a scheme would be impracticable, as they could not compel producers to sell to the Board, who could sell to registered producers, retailers or any manufacturers. Also the Board had not the financial resources which would enable them to purchase a crop estimated to be between 15 and 20 million pounds annually. In all the past purchases of the Board, they had, rightly or wrongly, come to the opinion that the potatoes they bought were surplus to human requirements.

He agreed that the Board were seeking substantially increased powers with regard to the manufacture from potatoes. When they had bought potatoes and could not sell them, they wanted some outlet. They had approached certain manufacturers with regard to the matter and had been unable to find any who were optimistic about the prospect. In a crop of four million potatoes, they might assume that one-tenth would be unfit for human consumption, assuming that the riddle was normal, and that disease was not more active than usual. They therefore might have anything from 300,000 to 500,000 tons of potatoes which were not capable of human consumption. They had no figures available, because, normally, they were fed to stock, which the Board considered was a wasteful method of disposal, and they desired a better outlet for that part of the crop.

Mr. Hubert Hull, who appeared with Mr. R. P. Croom Johnson, K.C., on behalf of the Board, asked whether there were any products being manufactured in this country of which potatoes formed the raw material, putting aside potato meal. Captain Mollett replied that he knew of none. Mr. Hull asked Captain Mollett if he knew whether outside this country potatoes are used to a large extent as a raw material in the production of other materials. Captain Mollett said that this was done to a large extent in certain Continental countries, and he did not see any reason why they should not be made available for the production of similar quantities in this country.

Disposing of a Recurring Surplus

Replying to further questions, Capt. Mollett said that the use of potatoes as a raw material in the manufacture of certain products should not be left out of account, as it would get rid of a recurring surplus. Apart from their chemical investigations, and their contract with the Farmers' Marketing Supply Co. at Wisbech (potato meal), they had interviewed a number of firms on the manufacturing side, and their attitude had been uniformly pessimistic. The assistance they had offered was trivial, and the Board had been surprised at the very generous offers of assistance during the inquiry.

On the resumption of the inquiry on Tuesday, Captain Mollett, in reply to Mr. Granville Sharp, who appeared on behalf of Smith's Potato Crisps (1929), Ltd., said that the reason why the Board wished to produce resins was that in the manufacturing process something might accidentally emerge, and the Board did not want to act unlawfully in manufacturing something for which they had no powers. For that reason the Board desired to have as complete a list as possible, so that their position would be legalised. The obvious article of manufacture was potato meal, but the Board had not made up their minds as to what, if any, they would manufacture. The Board saw no reason why they should be confined to manufacturing articles that did not make a profit. They were not a trading concern for a profit, but would prefer to make a profit rather than a loss.

Replying to Mr. John Senter, who represented the glucose industry and seed crushing industry, he said there were 31 members of the Board. He could not say that any of them had any technical experience in the manufacture of articles from potatoes, but one of their members, Mr. William Gavin, was a leading official of Imperial Chemical Industries, Ltd. The powers of the Board at present were mainly of a regulatory character, and if the amendments were approved, that would be their main purpose. The Board would prefer to co-operate with manufacturers, but had not found them optimistic. Without powers to manufacture, the Board could be dictated to by manufacturers, who could state their own terms. One of the objects in having the powers was that it would be a good bargaining point when dealing with manufacturers. Firms might include potatoes as a raw material in manufacturing articles, but they might get tired of using them, and the Board might find it necessary to take it over; they could not do so without the powers they were seeking. Private enterprise might not come to their rescue, and the Board might find it useful to have these powers in hand. There came a point when research ended, and it was necessary to start production on a commercial scale. He agreed it was improbable that synthetic chemicals would appear in manufacturing dried potatoes. Alcohol was probably one of the most popular articles manufactured from potatoes. In the manufacture of alcohol there would be by-products.

Manufacture of Plastics

Mr. Senter: I do not agree that some of the things in paragraphs four and five (alcohols and synthetic organic chemicals prepared from ethyl alcohol; and plastic and synthetic resins for use in the moulding, varnish and paint industries) emerge as by-products of potatoes. Once you get into the field of synthetic organic chemicals, you are reaching an industrial process which is not only elaborate, but highly protected by letters patent, and hedged with secret processes?

Captain Mollett: I agree, but I must qualify that, because nobody is engaging in these processes so far as potatoes are concerned. I know of no manufacturer in this country who is manufacturing these articles from potatoes, so that apparently we shall hold the first patent.

Later, Captain Mollett was questioned by Mr. Davidson Pratt. The witness said that the Board had examined the possibilities of the manufacture of alcohol, but not of its by-products. He had no knowledge of any commercial process in operation concerning plastics, but he had no doubt that their experts had. He had reason to believe that potatoes were being used into such commodities in other countries. He was not prepared to say it was possible to get alcohol as a

by-product from potatoes, and he was prepared to accept Mr. Pratt's statement that alcohol could not be obtained directly. He could not say whether the same applied to plastics, because he was not an expert.

Mr. Pratt said that he was going to submit that as these chemicals and plastics could not appear as by-products, no case had been made out, and then asked whether the Board had any intention of using any alternative raw material to make up for any deficiencies of potatoes, and Captain Mollett said they had not. He considered that the P.M.B. might succeed where private enterprise might have failed to get supplies of raw materials.

Replying to Mr. Pratt, the witness agreed that in order to erect factories the Board would have to have capital, which would be provided out of the funds of the Board provided by producers. They could also obtain credit in the usual way from the bank. If there were any profits, they would go to the funds of the Board, and if they were very big, would be distributed to the producers. Any losses would be met by the fund, and if the fund was inadequate to meet the losses, they would close down. The Board would then have to incur a debt, and wait until their funds had accumulated and obtained a rosy hue again. They had managed to meet their liabilities so far, and operated for some months without collecting a penny as their credit was good at the bank. He agreed they might be involved in the expenditure of considerable capital in erecting factories, but they would be guided by the amount of capital at their disposal. They could only "come back" on the producers to the extent of 1s. an acre to meet losses. It was impossible to say how the raw material would be provided for the factories, but possibly they would buy from authorised merchants.

Mr. Pratt: What price would you pay or offer for these surplus potatoes? You may have to pay a price, and would it bear any relationship to a price that would be economic to manufacturing?

Captain Mollett: It might or might not.

Mr. Pratt: Then you might have to pay a price that would be higher than economic for manufacture?

Captain Mollett: Yes.

Replying to further questions, Captain Mollett said that the minimum price paid for surplus potatoes last year was £1 a ton, which was 7s. 6d. more than Mr. Pratt had previously suggested was an economic manufacturing price. It did not necessarily follow that because private enterprise had not found it profitable the Board should not. They would make a product depending upon the price of surplus potatoes at the time. They would prefer to co-operate with existing organisations so that they could get elasticity. They had been in touch with distillers, but the negotiations, although of a technical nature, were fairly final, as they could get no encouragement. The Board suspected that there might be different ideas as to "reasonable profit," but they took the view that they could do what the distillers could not.

Hydrocarbon Solution of Terpenes

Prevention of Oxidation on Storage

ON long storage of turpentine, discoloration, increase in specific gravity, and often precipation is liable to occur owing to oxidation. Dupont and Crouzet (*Bull. inst. pin,* 1929, *58,* 101-8) have suggested the use of anti-oxidants such as hydroquinone, gallic acid, pyrogallic acid, activated carbon, and stanuous chloride, and Smith and Holman (*Ind. Eng. Chem.,* 1934, *26,* 716-8) have reported that calcium oxide was also able to preserve turpentine. Owing to the low solubility of terpene oxidation products in petroleum hydrocarbons, a solution of turpentine in petroleum hydrocarbons (used as paint and varnish thinners) tends to oxidise and precipitate. With this type of product, Borglin (*Ind. Eng. Chem.,* 1938, *30,* 639-640) has verified the results of the above investigators with relation to hydroquinone and calcium oxide.

Detection of Cobalt, Copper and Ferrous Iron

Use of 2-Nitroso-1-Naphthol-4-Sulphonic Acid

ACCORDING to Sarver (*Ind. End. Chem., anal. ed.,* 1938, *10,* 378), although the 2-nitroso-1-naphthol-4-sulphonic acid forms sparingly soluble salts with several metals, none is sufficiently insoluble to make it of value as a precipitant. However, it gives beautiful red, orange, and green colour reactions with cobalt, copper, and ferrous iron, respectively. In concentrated solutions precipitates are formed, but from dilute solutions the dyestuffs do not settle out, and are stable over a period of months.

The reaction with ferrous iron is most intense at a *p*H of 5, and the colours are markedly weaker at higher and lower acidities. With cobalt, on the other hand, a greater latitude is permissible, and the most favourable range is 7 to 8; however, if the solutions are not too dilute, good colorations can be obtained at any *p*H greater than 3. Ferric iron gives a much weaker colour reaction than do cobalt, copper, and ferrous iron, but nevertheless enough to cause interference; this can be suppressed by the addition of fluoride. No means have been found for suppressing the mutual interference of the other ions, but ferrous iron can be oxidised to ferric, which does not interfere in the presence of fluoride. Copper can be removed as sulphide, and cobalt may be removed by classical methods when required. However, they may usually be recognised in the presence of each other by the colour. Nickel interferes only when present in high concentration; it is possible to detect cobalt in the presence of 1,000 times as much nickel, or more. Chromium and other common ions, except cyanide, do not interfere; cyanide prevents the reaction from taking place.

The sensitivity of the test is very great. When none of the interfering ions is present, it is comparatively easy to detect cobalt or iron in concentrations of one part in 20 million; the colours given by copper are only slightly less intense. Blanks must be used for the great dilutions, since the reagent itself is yellow. It is also necessary to allow some time for the colour to develop in very weak solutions; the reaction may be speeded up by heating. When a sufficient sample is available, it is convenient to work in Nessler cylinders, adjusting the *p*H with sodium acetate and acetic acid.

The reagent may be prepared easily and with excellent yields, by the action of nitrous acid upon 1-naphthol-4-sulphonic acid, according to the method of Witt and Kaufmann (*Ber., 24,* 3,160).

Ten Years Back

From "The Chemical Age," July 28, 1928

The total imports of chemicals and chemical preparations into India, excluding chemical manures and medicines, during the year 1927 were valued at Rs. 266 lakhs, as against Rs. 232 lakhs in the previous year.

* * * *

A new organisation, the Canadian Chemical Association, has been formed to federate the existing chemical organisations in Canada for the promotion of common aims. Professor G. S. Whitby, of McGill University, is the first president.

* * * *

The German-owned "San Pedro" plant is installing new machinery for the manufacture of nitrate of soda under the "Banthien" process, which was developed in the German potash industry and recommended by the head of the research bureau of the Nitrate Producers' Association as adaptable to the Chilean industry. The patent rights of this new process for Chile have been purchased by German interests and a separate company formed for its development.

From Flask to Plant*

By
W. C. PECK, M.Sc., M.I.Chem.E., A.I.C.

A PROBLEM which faces almost every chemist at some point in his career is the transfer of a process from the laboratory to the manufacturing plant. Even if the chemist himself does not assume responsibility for the transfer he cannot, or should not, disregard the problem, for he can do much to make that development easier and quicker.

A chemical product can be produced in glass apparatus in small quantities in fairly consistent yields. If the process or the product is new, then there are usually four distinct stages which the process undergoes in being developed to the productive plant, namely, (1) laboratory scale, (2) small scale plant, (3) pilot plant, and (4) the running plant.

In the research laboratory the process should be worked out as completely as possible, and the directions for the process should be such that independent workers can exactly duplicate the yield and the quantity of the products. As models for the research chemist to copy, one can cite the admirable working instructions for the preparation of chemicals published under the title of "Organic Syntheses," which originated at the University of Illinois.

Optimum Yield

The chemist soon realises that the work he is engaged upon is solely for the purpose of producing profit. That is, the process developed by the chemist is simply a means of taking materials (raw materials) having a certain value and converting them into another material having a higher value. Thus, the commercial process is not always the one having the highest yield. The optimum yield, *i.e.*, the most profitable yield, need not be that most nearly approaching 100 per cent. It is possible and probable that the nearly theoretical conversion of one of the raw materials is only obtained by having the rest of the raw materials in excess. Thus, the increase in yield may only be obtained at the increased cost of raw materials.

The optimum yield can often only be got at by running a series of experiments in which the reacting substances are varied in amount. In a works, this is all important—the management want to act always quickly, so the research chemist in his work is well advised to plan his work. He should consider all those points which may affect the yield of his product, and he should plan his series of experiments so that the various influences which may affect the yield can be examined. His plans should be quite definite and put down on paper. His experiments should be planned to run in parallel so that the time required is greatly shortened. The research chemist who carries out his experiments in series, one after another, will find that method so lengthy that generally all interest in what he is doing is lost by the management. Therefore, he should plan to get quick results.

Processes developed should be possible on the large scale. Here one comes against the problems of the materials of construction for the productive plant. The research chemist should always have in mind that his process is valueless unless it can be carried out in plant constructed in materials other than glass.

Care is needed in developing to the small scale plant. To obtain results quickly the chemist should work with the smallest quantities that promise full results. Then, having obtained a repeatable process, the scale of operations can be multiplied. In order to keep a grip on the process, it is seldom advisable to increase the scale of operations by more than five times. A reaction can take place smoothly in a small flask, but can be violent in a large flask. Many of the organic preparations published in practical books are impossible to multiply up. The "pop" pleasantly amusing in the test tube, may be the forerunner of a devastating explosion in the reaction vessel. Processes involving the use of oxidising or nitrating substances should always be treated with caution; what works in a 1-litre flask may be dangerous in a 10-litre flask.

Small Scale Plant

With certain closely related substances, where the processes are more or less stereotyped and the plant practically standardised, a general method of manufacture may have been worked out. Works practice for the process may be extensive that no unforeseen results are likely. Then, if the new substances are of one of these standardised types of substance, the middle scale, or small scale, plant stage can be partly or wholly omitted.

If the product or process is new, then a middle stage is important, for here the chemist comes against two important factors (1) costs of production, (2) intransigent materials. With regard to cost it is necessary to consider raw materials, labour, supervision, fuel and energy, and losses due to handling.

Materials for the construction of the plant must withstand the action of the chemicals themselves, and also the physical conditions imposed by the reaction. Chemical plant is expensive to erect and expensive to alter; hence, even if the laboratory scale did reveal solid ground for designing the large scale plant, with new processes or products it is hazardous to proceed directly. The laboratory stage in many instances leaves much to be cleared up, but the middle stage brings a fresh set of problems as well. It is not surprising, then, that many likely processes reared in the laboratory come to untimely ends in the middle stage.

The experimental plant is quite different from those working models of well-known industrial plants often found attached to academic laboratories. The plant should be (1) of a size that results can easily be obtained, (2) built of the proper constructional materials, and (3) easily dismantled and erected to allow for research on new lines. Plant should also be adaptable to rapid modification for bringing about changes in conditions affecting the reactions. Small scale plants are seldom beautiful, seldom even presentable, but they fulfil their purpose if they work.

Trouble should be expected. It seems that unless every precaution has been taken to prevent a reaction going astray it is bound to find a way to do so. If a process works right the first time there is something wrong with it. It can be summed up in that phrase of undaunted optimism, "There's a snag somewhere!"

Recovery of By-Products

In the middle development stage, a fresh class of observations have to be made and measurements taken. The process is split up into a series of unit operations such as grinding, mixing, heat transfer, filtration, rectification, and each considered individually. Thus, in the case of gas absorption or washing, there is the question of gas velocities, periods of contact with absorbing liquids, etc., to give the most chemically efficient and financially economic results. In the case of mixing, on small scale, shaking in a flask will do, but on a large scale, the rate of addition and method of addition, *i.e.*, A to B, or B to A, under the surface or on the surface, have to be decided.

The chemist often thinks of by-products as valuable sources of profit. They are often in practice a nightmare to those who have to dispose of them; county and borough councils and river commissioners have deep-rooted objections to certain types of free gifts.

In the middle stage, the quantities of raw materials and the

* Being part of a lecture delivered before The Chemical Club, West Ham Municipal College, London.

quantities of product and by-product must balance. The process must be put on a quantitative basis. Every pound of material entering must be accounted for. In the laboratory scale it is often possible to add a number of substances and then proceed to heat them under a reflux condenser, but in the intermediate stage it may become apparent that heat evolved may be greater than can be handled by reflux condenser. Then a modification such as gradual addition of one reacting substance is adopted.

In the laboratory a flask can be shaken, but on a large scale mechanical agitation must be provided. Agitation can obviate the use of organic solvents which may be necessary on laboratory scale. By keeping and bringing all the reacting substances into contact, the cost of solvents necessary to bring the substances into solution can be saved. It is good advice to keep the small scale plant simple, and do not add gadgets. When faced with small troubles, splashing liquors or escaping fumes, look for and attack the cause and do not add device after device to counteract symptoms.

Coming to the pilot plant, the problem is taken away from the chemist as far as chief responsibility is concerned. At this stage a large amount of data should have been derived, such as chemical reactions and other factors limiting the size of the vessel; relative output for any determined size; labour cost probable; quantities of raw materials, fuel, and steam; and the need for operations to be continuous or batch processes.

The pilot plant is a commercial size unit worked to obtain its efficiency, so that, from the results of the working, modifications can be made before embarking on the full size plant.

Passing from the pilot plant to the running plant, the arrangement of the plant and methods of conveying the materials from one plant item to another have to be decided. In addition, there is type of building, source of power, light and water, and mechanical aids to labour. Decision as to scale of operations has to be made on the basis of an estimate of the sales. Consideration also has to be given to type of demand, *i.e.*, whether seasonal or continuous.

The Chemical Engineering Problem

The chemical engineer who is mainly concerned with the 3rd and 4th stages looks at any process as a series of unit processes, which in their proper sequence and co-ordination constitute a chemical process as conducted on the industrial scale. The unit processes are mainly physical although directed to an ultimately chemical end. They include flow of fluid, flow of heat, evaporation, drying, distillation, gas absorption, extraction, filtration, mixing, crushing and grinding, size separation, etc.

The process, as it leaves the research chemist, is a definite chemical engineering problem and its solution is made by a number of definite stages. Each stage is usually distinct in itself, and is followed by the next stage in perfectly logical order. The solving of the problems in the following order saves much waste of time :—(1) Proposal must be a source of profit, (2) chemical factors involved, (3) physical factors, (4) mechanical factors, (5) legal obligations, (6) economic factors, (7) planning of development, (8) organisation of chemical engineering project. Every operation must be profitable, and the habit of looking at £ s. d. point of view must be rapidly acquired.

Chemical Factors Involved

Many processes which are easily worked in the laboratory in glassware, particularly those using hydrochloric acid, are quite impracticable in large scale apparatus because of difficulties of finding materials to withstand chemical action of materials reacting. A reaction may take place smoothly, certainly and quantitatively; because in a glass flask it can be shaken, cooled immediately and effectively at some vital point easily recognisable. Effluent gas can be led gently away, the volumes and heat they carry causing no qualms. Conditions on large scale are very different from the laboratory, where the presence of a large surface of glass may have an effect. On large scale, materials of corrosion may be corroded away, impurities may be introduced into finished product, and the reaction may be influenced by materials of construction.

Corrosion depends on the ratio of surface exposed to volume of substance. The laboratory chemist knows that a scrap of iron in a beaker of sulphuric acid is dissolved, yet C.O.V. is stored in iron drums and tanks and conveyed in iron pipes. Corrosion is influenced by traces of impurities (a) in materials of construction (therefore always work with plant liquors under working conditions), and (b) in reactive substances (consider synthetic nitric acid in aluminium drums, where nitric acid and a trace of chlorine leads to rapid attack). Corrosion rates vary enormously with slight changes of strength of materials, temperature, absence or presence of air, or physical state of metal surface, and printed lists are useless and dangerous.

Physical and Mechanical Factors

Contamination is important in the case of the foodstuff and pharmaceutical industries. Reaction can be influenced by materials used, as catalysis can be set up. Consider for instance: (a) benzyl chloride in stoneware where iron or lead causes substitution in the nucleus, and (b) chlorbenzene made in iron vessels where the iron vessel itself acts as catalyst.

Physical factors are those that control the output of plant of given size, *i.e.*, plant unit. They comprise (1) transfer of heat, (2) pressure of reacting substances, and (3) flow of liquids, viscous substances, etc. Pasty substances are often more easily handled in small units than large ones.

Mechanical factors concern the ability of the plant to perform the work required of it. Any piece of plant designed has to satisfy the designer that it will satisfactorily withstand (1) mechanical forces set up by the plant in operation, *e.g.*, stirring devices, (2) force due to gravity, and (3) pressure, *i.e.*, internal pressure as in autoclave or pressure in jackets due to steam or other heating media.

The principle of similitude must be borne in mind, *i.e.*, the use of models is only of value when some criterion can be calculated which enables the performance of a machine on a larger scale to be estimated from the results of the experiments with the models. Applied to a chemical problem, consider the case of a reaction vessel, that contains materials undergoing an exothermic reaction, and where the heat liberated is taken away through the surface. If the time of reaction is 3 hours, then in a pan of larger diameter this time of reaction could not be obtained. The mass of the reacting material will increase as the cube of linear dimensions, whereas the cooling surface only increases as the square of linear dimensions.

Legal Obligations

Coming to legal obligations, it is well to remember that many processes are subject to Acts of Parliament and all are subject to common law, which includes matters of trespass, nuisance, and negligence. No effluent can flow over a neighbour's land. There must be absence of fumes, but what is a nuisance in Mayfair is not necessarily a nuisance in Bermondsey. Duty to other persons, workers, and neighbours, demands the insurance of boilers and pressure vessels. In addition, there are building by-laws which have concern for the stability of the building, limitation of fire risk, and public health.

Economic factors are best considered by making out flow sheets, with quantitative balance shown against every step. The residue cheerfully thrown away in the laboratory can be a special problem. Volumetric flow sheet has to be taken into account as well as weight of reacting substances. Also make a plant arrangement diagram. From these, estimates of productive cost of material can be made, estimates for plant obtained, and the amount of capital necessary to build the plant, and keep it in operation, determined.

Canadian Chemical Industry

A Record Year of Production

PRELIMINARY statistics for 1937 show that the 738 Canadian factories engaged in various branches of the chemical industry turned out products valued at $144,993,105, as compared with $126,874,791 in 1936. Last year's production was the highest ever reported for this group of plants, being an increase of 14.3 per cent. during the twelve months, and 4.7 per cent. when compared with the 1929 total. Every group in the industry showed an advance last year with the exception of wood distillation, in respect of which a decline of 9.12 per cent. is estimated. Coal tar distillation advanced by 15.5 per cent.; acids, alkalies and salts by 17.8 per cent.; compressed gases by 16.9 per cent.; fertilisers by 36.6 per cent.; medicinals and pharmaceuticals by 8.9 per cent.; paint by 6.6 per cent.; soaps and cleaning preparations by 20.3 per cent.; toilet preparations by 3.8 per cent.; inks by 5.5 per cent.; adhesives, 5.9 per cent.; polishes, 6.6 per cent.; and miscellaneous, 20.2 per cent.

Imports of chemicals and allied products increased 17 per cent. in 1937 to $37,393,423. Purchases from the United States made up 60.2 per cent. of the total, and shipments from the United Kingdom accounted for 21 per cent. Exports advanced by 22 per cent. to $21,666,897, of which 44.9 per cent went to the United States and 24.2 per cent. to the United Kingdom.

Calcium Metaphosphate

Large Scale Production for Fertiliser

THE production of calcium metaphosphate on a large scale for use as a fertiliser is described by Curtis, Copson, Abrams and Junkins (*Chem. Met. Eng.*, 1938, *45*, 318-322). The process involves the oxidation of phosphorus and the interaction of the resulting pentoxide with phosphate rock, directly producing metaphosphate.

Phosphorus is pumped from a 20,000 tons storage vessel as a liquid into a combustion chamber, which it enters through jets, being dispersed by high pressure air. The temperature of the combustion chamber is raised initially by burning oil in it; the phosphorus is then introduced and ignites spontaneously. The pentoxide which is formed enters an absorption tower packed with rock phosphate (in lumps not smaller than $\frac{3}{4}$ in., and not larger than 3 in. across). Metaphosphate forms and runs down the tower as a viscous glassy liquid and collects in a pool at the base of the tower, where it is tapped at a temperature of 2,200° F. The average temperature of the vapours entering the tower is 1,900° F., and of the combustion chamber, 1,800-2,200° F.

The metaphosphate is conveyed to rotary coolers, in which it solidifies and is discharged as flakes, which are then ground, screened, and bagged. The highest output so far obtained has been about 2 tons per hour, with a 98 per cent. recovery of P_2O_5. About 75 lb. of fluorine per hour are potentially recoverable from the waste gases. The product contains 65 per cent. of P_2O_5, practically all available, and is the cheapest form of phosphorus for fertilising.

FINAL DIVIDENDS OF BENN BROS., LTD.

THE directors of Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE have recommended the payment of the following dividends, less tax, for the year ended June 30, 1938:—3 per cent. on the preference shares, which with the interim dividend of 3 per cent. paid in February makes 6 per cent. for the year; 10 per cent. on the ordinary shares, which with the interim dividend of 5 per cent. paid in February makes 15 per cent. for the year; 2s. per share on the deferred shares, which with the interim dividend of 1s. per share paid in February makes 3s. for the year.

Pure Oxygen

A Laboratory Method of Preparation

A METHOD for the laboratory preparation in considerable quantity of very pure oxygen is described by v. Wartemburg. (*Zeit. Anorg. Allg. Chem.*, 1938, *238*, 297-298). The oxygen is obtained by the decomposition of pure hydrogen peroxide solution, 30 volume per cent. strength. 500 cc. are placed in a flask fitted with a headpiece through which can be lowered into the liquid a piece of thin nickel sheet which has been electrolytically platinised, and then heated to redness in hydrogen in order to convert the platinum black to a bright grey.

The evolved oxygen, which comes off at the rate of about 8 litres per hour at 30° C., passes through a small column of glass beads to trap spray, and then down a tower containing a platinised copper spiral which ensures the decomposition of any traces of gaseous peroxide. The gas is then dried by passage through concentrated sulphuric acid, and is finally delivered at a pressure of about 5 cms. of mercury maintained by a mercury trap. The oxygen thus obtained is quite pure, containing in particular no traces of peroxide. The rate of evolution falls off when the strength of the solution becomes rather weak, and in practice about 90 per cent. of the available oxygen in the liquid can be obtained.

Synthesis of Styrol

Chlorination of Ethylbenzol Obtained from Petroleum Cracking

IT is shown by Popov and Bejlin (*Organic Chemical Industry*, *4*, 152-7) that ethylbenzol, a part of the xylol fraction obtained by cracking petroleum, can be converted into styrol by treatment with chlorine. The alphachlorethylbenzol obtained is hydrolised and the methylphenlycarbinol which results is dehydrated.

The output and the quality of styrol depend to a high degree on the purity of the ethylbenzol fraction. This is attained by treating the fraction first with sulphuric acid (97 per cent.) and, after neutralisation with soda, the product obtained is rectified. Olefines and xylols are thus eliminated.

The optimum output of the styrol fraction, containing 85 to 86 per cent. of pure styrol, is 8 per cent. of the original purified xylol fraction. Since almost the whole amount of aromatic hydrocarbons of the xylol fraction are converted into chlorine derivatives it is recommended not to take the chlorination process very far, but leave 50 per cent. of hydrocarbon untreated. The treatment with chlorine is best carried out at 100 to 110°; at lower temperatures the action of chlorine on ethylbenzol is not sufficient. The styrol, separated from the dehydration product by distillation *in vacuo*, becomes after some days a colourless gelatinous mass.

TESTING pH IN ULTRA-VIOLET LIGHT

As early as 1904 the variations in the fluorescence of certain substances with a variation in the *p*H of the solution in which they are dissolved, was noted by Kaufmann and Beisswenger. It has now been suggested that when these changes are clear, and capable of inversion, the substance which produces them can be used as a fluorescent indicator of *p*H. In testing the *p*H of coloured or cloudy liquids, this method is of the greatest value as it avoids the danger of error in determining the point at which an ordinary indicator changes. The tests have to be made in a dark room, and the apparatus used should be of pyrex or quartz to allow adequate penetration of the light into the solution. The indicator to be used depends on the *p*H of the solution to be tested, thus, for example, β-methylombelliferone, which changes near neutrality, is suitable for use in titration of strongly acid or alkaline solutions. Other indicators change at a given *p*H.

Beit Memorial Trust

Fellowship Awards

AT a meeting of the Trustees of the Beit Memorial Fellowships for Medical Research last week, it was announced that the total number of Fellowships held by full-time workers during the year 1937-38 was 23. The number of candidates at the present election was higher than usual. Five applied from Canada and three from Australia. Fortunately, reserve funds made it possible to award more Junior Fellowships than are ordinarily given each year, and the election of 12 new Junior Fellows brought the total of those elected since the beginning of the Trust in 1910 to exactly 200.

The following were among the new elections made:—Senior Fellowship (value £700 a year): David Ezra Green, M.Sc. (New York), Ph.D. (Cambridge). To continue his research on the rôle of vitamin B_1 in the oxidation of pyruvic acid, and to study a new flavin-protein compound in milk, at the Institute of Biochemistry, Cambridge University.

James Frederic Danielli, B.Sc., Hons., Ph.D. (London). Commonwealth Fund Fellow, 1933. Since 1935 demonstrator in Biochemistry and Biophysics, University College, London. Proposed research—the permeability of normal and denervated muscle to metabolic products and to drugs, at the Institute of Biochemistry, Cambridge University.

Hermann Lehmann, M.D. (Bale), Ph.D. (Cambridge), research worker, Physiological Institute, Heidelberk, 1934-36 and since 1936 research student of Christ's College, Cambridge. Proposed research—blood sugar in animals, and iron metabolism in plants, at the Institute of Biochemistry, Cambridge University.

The Trustees have awarded Beit Fellowships for Scientific Research, tenable at the Imperial College of Science and Technology during the academic year 1938-39, as follows:—

Extensions of Fellowships already satisfactorily held for one year to:—

H. A. McKay, B.A., B.Sc., for the continuation of his investigation of chemical problems by the radioactive indicator method, under the direction of Professor H. V. A. Briscoe, D.Sc., A.R.C.S., D.I.C.

New Fellowships tenable for one year but renewable for a second year to:—

J. L. O. G. Michiels, B.Sc., A.R.C.S., Royal College of Science, for research on the positions and widths of the energy levels of atomic nuclei by means of experiments on the capture of slow neutrons by various elements, under the direction of Professor G. P. Thompson, F.R.S.

E. J. Harris, B.Sc., Royal College of Science, for research on hydrocarbon oxidation and the reactions of peroxides with reference to carbon processes, under the direction of Professor A. C. G. Egerton, F.R.S.

Chemical Matters in Parliament

Power Alcohol Duty

IN the House of Commons on July 25 Major Procter asked the Chancellor of the Exchequer whether he could state the total amount paid to the producers of power and industrial alcohol in respect of the allowance of 8¾d. per proof gallon during the last financial year, and the estimated amount so payable in the financial year 1938-39?

In reply, Sir J. Simon said the total amount paid during the financial year 1937-38 on account of the allowance of 5d. per proof gallon payable in respect of power methylated spirits, industrial methylated spirits and spirits used duty-free in arts and manufactures under Section 8 of the Finance Act, 1902, was £933,000. As regards 1938-39, the amount may exceed £1,000,000. He pointed out that the statutory rate of the allowance is 5d. per proof gallon and that it is payable to the methylator in the case of power methylated spirits and industrial methylated spirits, and to the authorised user of the spirits in the case of spirits received under the Finance Act of 1902.

Sulphite Cooking Process

Effect of Pre-treatment of the Wood on the Reaction

THE chemical reactions actually taking place between the lignin of wood and sulphurous acid in the sulphite cooking process are still unknown. Many theories have been proposed, but all of them lack unquestionable proof. Brauns and Brown (*Ind. Eng. Chem.*, 1938, *30*, 779-781) studied the effect of diazomethane methylation of wood on the sulphite cooking process and came to the following conclusions.

The cooking experiments with diazomethane-methylated wood confirm the assumption that the hydroxyl goup, which is methylated by diazomethane, plays the decisive rôle in the sulphate cooking process. It is not surprising that more drastic reactions, such as a treatment of the wood with acids or alkalies, change the lignin by condensation or polymerisation in such a way that the reaction with sulphurous acid is hindered or at least reduced; but it is surprising that such a mild reaction as methylation with diazomethane brings about a change in the lignin molecule which prevents the dissolution of the lignin. This change cannot be very marked, since the methylation occurs in neutral solution at low temperature. It is evident that, by covering a certain hydroxyl group by a methoxyl group, the dissolution of the lignin is prevented. This does not mean that a reaction of the lignin with sulphurous acid does not take place. The results of the analysis show clearly that the lignin, after methylation with diazomethane, is still capable of binding sulphurous acid, but the amount is less than the amount which is taken up by untreated wood. The sulphur content of the methylated wood after treatment with cooking liquor is 0.51 per cent., about half as high as the sulphur content of the untreated wood meal sulphonated under mild conditions.

The results of the sodium bisulphite cook of the diazomethane-methylated wood seem to indicate that the dissolution of the lignin occurs in two stages. In the first stage, addition of sulphurous acid to the lignin complex forms the so-called solid lignin-sulphonic acid; and in the second stage, a rearrangement of the sulphonic group in the lignin complex with the participation of a hydroxyl group takes place, forming soluble lignin-sulphonic acid. In the diazomethane-methylated spruce wood only the first stage occurs because, by the covering of a specific hydroxyl group in the native lignin, the rearrangement and therefore the dissolution of the lignin is hindered. It is also possible, although not very probable, that the covering of the hydroxyl group may prevent a hydrolysis of a lignin-carbohydrate linkage. That at least a part of the lignin is combined with carbohydrate in the wood was shown in a recent experiment in which a compound was isolated which is soluable in certain solvents, which does not reduce Fehling solution, and which, on hydrolysis with 72 per cent. sulphuric acid, gives a lignin-like precipitate with 10.5 per cent. methoxyl content, whereas the solution contains sugars strongly reducing to Fehling solution.

DRYING OILS FROM COTTONSEED OIL

IN order to convert cottonseed oil into a drying oil with properties not inferior to those of linseed oil, cottonseed oil (A. A. Ivanova, *Zhurnal prikladnoj khimii*, 1938, 11, 564) was first blown with air at 120° in the presence of either lead, calcium, or manganese oxide as catalyst; the acetyl value of the produced oil was 85. The oxy-group added by this treatment on the place of the double bond was then taken off by dehydrating the oil at 275° to 280° in the presence of aluminium oxide and zinc metal; the acetyl value decreases thereby to 11. The oxidised and dehydrated oil dries when using 2.5 per cent. lead-manganese siccative in 24 hours. When pigmented with iron oxide, zinc white, etc., the varnish prepared from oxidised and dehydrated cottonseed oil shows properties not inferior to that of linseed oil varnishes. Paints manufactured from this product showed good results with regard to hardness, elasticity, water and heat resistance, and atmospheric action.

Personal Notes

THE LATE MR. HUGH NASH TORRANCE, of Belmont, Bitton, near Bristol, formerly a member of Torrance and Son, Ltd., makers of paint mills, left £24,690, with net personalty £22,986.

MR. HARRY LANE, a director of Modern Fuels, Ltd., Seaham Harbour, has agreed to contest the Seaham Division as a National Labour candidate in the next election. His opponent will be Mr. E. Shinwell, who defeated Mr. Ramsay Macdonald by 20,000 votes at the last general election.

MR. R. WILLIAMSON, M.Sc. (Tech.) has been appointed to the first Harlow Fellowship of the value of £250 a year for research in one of the branches of science relating to the textile or dyeing industries. The Harlow Fellowship was established by a gift of the late Mr. Herbert Harlow, of Bradford.

MR. ERNEST R. TROUGHTON, vice-chairman of International Diatomite Co., Ltd., and of its subsidiary, Moler Products, Ltd., has been appointed chairman of both companies. Mr. F. H. X. Gwynne, managing director of Moler Products has joined the board of International Diatomite, so that the boards of the two companies are now identical.

DR. JAMES ECKERSLEY MYERS, assistant to the Vice-Chancellor and senior lecturer and tutor to the Faculty of Science at Manchester University is recommended for the position of principal of the Manchester College of Technology, at a salary of £1,500, in succession to Dr. B. Mount Jones. Dr. Myers was appointed Beyer Research Fellow in Science in 1911.

LORD CADMAN has been granted the Freedom of the Borough of Newcastle-under-Lyme in recognition of the services he had rendered to the country and the distinction he had brought to his native town of Newcastle. The presentation was made by the Mayor of Newcastle, Alderman T. O. Harper, at a special meeting of the town council in the Guildhall.

MR. R. E. HUFFAN, first chairman of Lever Bros., Ltd., Port Sunlight, who has joined the Home Sales Executive of Lever Bros. and Unilever, is succeeded in the chairmanship of the Port Sunlight Company by Col. Ernest Briggs, who is the chairman of the Soap and Candle Trade Federation, and has been technical adviser to Lever Bros., Ltd., and Unilever.

MR. FRANK S. RUSSELL, who is chairman of General Refractories, Ltd., has relinquished a number of his chairmanship and directorial positions, including those with International Diatomite Co., Ltd., South Wales Refractories, Ltd., Llangennech Brick and Tile Co., Ltd., N. B. Allen and Co., Ltd., and Moler Products, Ltd., in order to leave himself more time for work he is undertaking for the benefit of the distressed areas in South Wales.

THE LATE SIR HENRY SUTCLIFFE SMITH, of Ingerthorpe Grange, Markington, near Harrogate, an executive director of the Bradford Dyers' Association, for many years chairman of the Colour Users' Association, a member of the Dyestuffs Advisory Licensing Committee and the Dyestuffs Industry Development Committee, and past president of the Society of Dyers and Colourists, left £142,278, with net personalty £121,578, on which £25,876 estate duty has been paid.

PROFESSOR J. C. PHILIP has been awarded the title of Professor Emeritus of Physical Chemistry in the University of London on his retirement from the University Professorship of Physical Chemistry at the Imperial College, Royal College of Science. Professor J. F. THORPE has been awarded the title of Professor Emeritus of Organic Chemistry in the University of London on his retirement from the University Professorship of Organic Chemistry at the same college. Professor Philip and Professor Thorpe have served as members of the staff of the Royal College of Science for 39 and 25 years respectively.

LORD AMULREE has been appointed chairman of the Council of the Royal Society of Arts for the second year in succession.

MAJOR F. A. FREETH, O.B.E., D.Sc., Ph.D., F.R.S., who has been research manager of Imperial Chemical Industries, Ltd., since the formation of the company in 1926, is retiring from that position, but has consented to continue his connection with the company in the capacity of consultant. Major Freeth, who comes of a military family, was educated at Liverpool University and at an early age gained considerable reputation as a physical chemist, becoming chief chemist to

Major F. A. Freeth.

Brunner Mond and Co., Ltd., in 1910. On the outbreak of the Great War he went to France with the Cheshire Regiment, but was recalled to England to undertake scientific work in connection with the supply of munitions. He rejoined Brunner Mond and Co. and for the remainder of the war he did valuable work in developing new processes for the manufacture of explosives. In 1924 he was awarded the doctorate in the Faculty of Mathematics and Physics in the University of Leyden.

OBITUARY

LIEUT.-COLONEL C. H. H. HAROLD, R.A.M.C. (retd.), director of water examination, Metropolitan Water Board, died on July 25, aged 53. He has published a number of scientific works on water supply and kindred subjects.

MAJOR JAMES SYDNEY BLAKE, representative of Pinchin, Johnson and Co., Ltd., paint manufacturers, was recently found dead in the street in Port of Spain, Trinidad. Major Blake supervised the West Indies and Central America field of the company's activities.

MR. FREDERICK WOODLAND TOMS, F.I.C., F.C.S., one of the first Fellows of the Institute of Chemistry and the Society of Chemical Industry, has died in Jersey, aged 82. Mr. Toms was the first official analyst of Jersey and held that office for 47 years. He did research work for three years under Edward Frankland, F.R.S., and was assistant in the private research laboratory under Dr. W. H. Perkin, F.R.S. His investigations concerned chiefly ensilage, fodder and explosives. As first official analyst of Jersey he did a great deal of useful work in assessing duty on and preventing the adulteration of alcoholic liquors and in supervising water and gas supplies and the fertiliser trade. His work has been mainly analytical; checking the composition of cements used for harbour contracts, controlling the purity of milk and butter, and giving expert evidence at inquests. In his early days he did pioneer work in practical field trials of fertilisers.

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Esterification of glycerol. Bertram and Rutgers, *Rec. Trav. Chim. Pays-Bas, 57,* 681-687.

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Analysis

Determination of alpha cellulose. Vieweg, *Papier Fabrik. (techn. Teil), 36,* 181-185.

Determination of total saturated fatty acids. Pelikan and Von Mikusch, *Oil and Soap, 15,* 149-150.

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Colorimetric determination of magnesium. Thiel and Eitelfriedrich, *Ber., 71,* 1,157-1,162.

Minerals, Oils, Gas, Tar

Phosphate process for the removal of hydrogen sulphide. Rosebaugh, *Refiner, 17,* 245-247, 288.

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Fractionation in multiple-draw petroleum columns. Nelson and Roland, *Ind. Eng. Chem., 30,* 730-740.

Solubility of paraffin waxes in petroleum fractions. Berne, Allen and Work, *Ind. Eng. Chem., 30,* 806-812.

Catalytic hydrogenation of phenolic oil in low temperature tar. Audo, *J. Soc. Chem. Ind. Japan, 41,* 126-129 B.

Cellulose, Paper

Alum in paper making. Booth, *Paper Maker, 95,* International No., 66-70.

Manufacture of cellulose from rice straw. Kita, Nagata and Kimura, *Papier Fabrik. (techn. Teil), 36,* 198-199.

Structure of cellulose hydrate. Kratky, *Z. Papier Pappe Zell. Holzstoff, 56,* 149-156.

Manufacture of homogeneous nitrocelluloses. Foulon, *Caoutchouc et Gutta-Percha, 35,* 174-175.

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Testing resistance of refractories to attack by carbon monoxide. Pukall, *Sprechsaal, 71,* 321-324.

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Emulsifying waxes. Lee-Charlton, *Soap Perfum. Cosmetics, 11,* 625-630, 642.

Liquid shaving creams. *Seifensieder Ztg., 65,* 449-451.

Paints, Pigments, Resins

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Preparation of latex. Leduc, *Rev. Générale Caoutchouc, 15,* 127-128.

Influence of vulcanisation on ageing. Dufraisse and Etienne, *Kautschuk, 14,* 102-109.

Acceleration of vulcanisation processes by arsenic compounds. Van Rossem and Bouwens, *Rec. Trav. Chim. Pays-Bas, 57,* 798-805.

Miscellaneous

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From Week to Week

THE JULY ISSUE of the "Information Bulletin of George Kent, Ltd.," is a centenary number devoted to the recent celebrations of the company.

IMPERIAL CHEMICAL INDUSTRIES, LTD., have disposed of the remaining portion of their land at Millhouse, Kyles of Bute, to the Ardlamont Estate Co.

THE GLASGOW CHAMBER OF COMMERCE has admitted the following firms: British Silk Dyeing Co., Ltd.; City Waste India Rubber Co.; Clyde Soyameal Factory, Ltd.

AIR FILTERS, TRANSFORMERS AND DESICCATORS, suction and pressure types, for the removal of oil, dust, and moisture, are described in a new leaflet (AF.1) of Lacy-Hulbert and Co., Ltd.

SINCE PRODUCTION OPERATIONS HAVE BEEN RESUMED at the bore of the Anglo-American Oil Co., at D'Arcy Farm, near Dalkeith, the best yield was obtained on July 23, when 600 gallons were led into the cistern.

A DECREASE OF ABOUT 12 PER CENT. in exports and of nearly 50 per cent. in imports is shown by the foreign trade returns of the United States for the month of June, compared with the corresponding month last year.

FOUR NEW ADDITIONS to the I.C.I. range of dyestuffs—Carbolan Green GS for wool, Caledon Dark Brown 6 RS for cotton and cotton viscose materials, and Naphthalene Leather Browns ADS and GDS—are announced.

TENDERS FOR THE SUPPLY of chemical and physical apparatus for the Torquay Girls' Grammar School are invited by the Devon County Education Committee. Details are available from the Secretary, County Education Offices, Castle Street, Exeter.

THE WORLD POWER CONFERENCE will hold a sectional meeting at Vienna, August 25 to September 2, when Sir Harold Hartley, F.R.S., chairman of the Fuel Research Board, and Dr. F. S. Sinatt, F.R.S., director of Fuel Research, D.S.I.R., will be present.

THE TITLE OF THE SECOND BOOK on page 73 of THE CHEMICAL AGE, July 23, should have read: "Organic Chemistry: A Textbook for Science and Medical Students," by Frederick Prescott and Dudley Ridge. The publishers are University Tutorial Press, Ltd., as stated.

ALUMINIUM INDUSTRIE, A.-G., of Neuhausen, Switzerland, propose to erect works at Resolven, in the Neath Valley, South Wales, where a site has been provisionally selected. It is also understood that a Czechoslovakia metal alloy concern is considering the establishment of works at Cwmbran, in Monmouthshire.

DURING THE LAST EIGHT YEARS the consumption of soap in Great Britain and Ireland has increased from 16.5 lb. to 18.6 lb. per head per annum for 1937, stated Mr. A. W. Henry, director of Lever Bros., Port Sunlight, Ltd., at a luncheon at Port Sunlight last week. That represented an increase in manufacture of 60,000 tons per annum.

AN ORDER ISSUED UNDER THE AUSTRALIAN CUSTOMS ACT provides that piece-goods exceeding 3 oz. per square yard and resembling woollen piece-goods used as outer clothing will be subject to duty as woollen piece-goods if the staple is wholly of synthetic fibres, or a mixture of both wool and synthetic fibres, or synthetic fibres mixed with natural fibres other than wool, provided that synthetic fibres predominate. It is explained that the action has been necessitated by the increasing imports of synthetic imitations of woollens, though most synthetic imports more closely resemble rayon, hence they do not compete with Australian manufactures.

PRELIMINARY FIGURES FOR THE CONSUMPTION OF ALUMINIUM in the United Kingdom in 1937 are given by the Aluminium Information Bureau as 44,000 long tons. This figure, it is stated, represents an increase of 28 per cent. as compared with the consumption in the preceding year, and is more than two-and-a-half times the quantity used in 1928. The increase of 28 per cent. in the consumption of aluminium compares with an increase of 20 per cent. in the consumption of copper and of nearly 19 per cent. in the consumption of tin. Lead showed a slight decrease in 1937, while the use of zinc in the United Kingdom increased by only 3.7 per cent.

THE CHINA CLAY STATISTICS for the first half of 1938 are very discouraging. Last year there was an increased business to the end of June amounting to 67,791 tons, but for the similar period for the current year there has been a drop of 141,054 tons of china clay above. The shipments in June last were 59,587 tons. The highest for the year, but compared with June, 1937, there is a decrease of 19,000 tons. American markets have also gone down from 75,500 tons in 1937, to 28,788 tons in 1938. Germany with 22,537 tons, shows some advance, whilst other Continental markets reveal very little change. Fowey was responsible for 32,232 tons china clay, against 49,623 tons in June, 1937; Par, 9,139 tons; Charlestown 6,962 tons, and 4,617 tons were despatched by rail.

A NEW SOLVENT DE-WAXING PLANT is to be installed at the Flandarcy Refineries, near Swansea.

A NEW PENSION AND LIFE INSURANCE SCHEME has been introduced by the National Benzole Co. It provides for employees over twenty-one years of age in receipt of a minimum salary of £2 per week, who are not included under the company's existing scheme.

THE BRITISH ALUMINIUM CO. AND ALUMINIUM, LTD., large Canadian aluminium producers, have formed joint plans for the production and rolling of aluminium in India. Companies will be registered shortly in India, having a total capital of approximately 12,000,000 rupees (£900,000).

THE CLAIM TO HAVE DISCOVERED a process for obtaining gold and silver from sea water is made by Dr. Hiroshi Suzuki, of the Central Research Institute of the Japanese Ministry of Finance. A plant to exploit the discovery has been established by the Meiji Mining Co., at a cost of £48,000.

THE WORKS OF THE OLDHAM ICE CO., were damaged last week as a result of the explosion of a cooler attached to the brine plant. A considerable portion of the roof was blown off, windows were smashed and the ammonia which was liberated drove people out of the adjoining houses. Five people had to be treated at Oldham Royal Infirmary as a result of fumes and shock.

THE DIRECTORS OF DUFAY-CHROMEX, LTD., in a progress report, state that after considerable research work with the assistance of Imperial Chemical Industries, Ltd., new dyes have been evolved which produce a naturalness of colour and brilliance not achieved up to now by any other process. New discoveries have been made in conjunction with Ilford, Ltd., which give the company the fastest emulsions yet evolved for colour photography.

OWING TO THE SUBSTANTIAL REDUCTION in Dutch exports of rayon yarns and the extremely unfavourable situation in the home rayon market, the board of the Hollandsche Kunstzijde Industrie (affiliated to Aku) has decided to make a further large cut in its production to about 50 per cent. of the 1937 output. Dutch rayon yarn exports for the first six months of 1937 amounted to 4,247,163 kg., whereas in the first half of this year they were only 2,800,000 kg.

A REPORT OF PROGRESS for the Special Areas in England and Wales, states that up to the end of June, 1938, offers of contributions towards rent, rates and income tax had been made to 59 industrial undertakings to induce them to set up factories in the Special Areas. On the Team Valley Trading Estate, near Gateshead, 59 factories had been completed up to the end of June, 57 being occupied and employing about 1,100 people. On the South Wales Trading Estate at Treforest, 19 factories were occupied at the end of June, giving employment to 419 people.

MEMBERS OF THE EXECUTIVE COUNCIL of the International Wool Publicity and Research Fund, formed to advance the interests of producers in Australia, New Zealand, and South Africa, have returned from a visit to Germany with the conviction that the synthetic fibre manufactured there from wood has become of necessity a definite commercial factor in the life of the nation, but less of the artificial and more of the natural product would be consumed in that country if exchange or other facilities could be arranged to enable German manufacturers to buy greater quantities of wool. The mission found that last year approximately 100,000 tons of the synthetic fibre were obtained by the processing of timber.

Company News

Anchor Chemical Co. have announced a maiden interim on ordinary of 10 per cent. actual, less tax.

Major and Co., in their report for the year to March 31 last, show debit brought in £5,232, plus depreciation £1,800, bank and other interest £1,449, tax, etc., making £8,932. Deduct profit £1,168 (£5,135), recovered in respect of goods supplied for three years to March 31 last, £2,250, etc., leaving debit of £5,224 forward.

International Bitumen Emulsions, in the accounts for the year to March 31, show that operations, prior to charging British, Dominion, and foreign taxes, have resulted in a profit of £16,183 (£14,882); less provision for these taxes, £4,112 (£3,532); transfer to depreciation reserve, £4,000 (£2,600); dividend 5 per cent., less tax (same); £1,908 (£1,326) forward.

Books Received

Utilization of Fats. By H. K. Dean. London: A. Harvey. Pp. 292. 15s.

Brewing, Science and Practice. By H. Lloyd Hind. Vol. I. Brewing Materials. London: Chapman and Hall, Ltd. Pp. 505. 50s.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

REDUCTION, ETC., OF IRON ORES.—F. W. Harbord. 20355.

METHOD FOR THE PRODUCTION OF OXYGEN BATHS by catalytic means.—M. L. Heim. (Germany, July 10, '37.) 20116.

TREATING SOYA BEANS.—A. A. Horvath. (United States, July 28, '37.) 20673.

MANUFACTURE, ETC., OF CYCLIC AMIDINES.—I. G. Farbenindustrie. (Austria, July 7, '37.) 20137.

METHOD OF ADDING LEAD TO STEEL.—Inland Steel Co. (United States, Nov. 30, '37.) 20301; (United States, April 30.) 20302; (United States, May 2.) 20651.

MANUFACTURE OF ANTISERUMS.—L. Mellersh-Jackson (Parke, Davis, and Co.). 20468.

PRECIPITATION OF COPPER by means of nickel.—G. W. Johnson (I. G. Farbenindustrie.) 20149.

MANUFACTURE, ETC., OF PEROXIDES.—G. W. Johnson (I. G. Farbenindustrie.) 20506.

MANUFACTURE, ETC., OF POLYMERISATION PRODUCTS from isobutylene.—G. W. Johnson (I. G. Farbenindustrie.) 20666.

MANUFACTURE, ETC., OF FUELS.—G. W. Johnson (I. G. Farbenindustrie.) 20667.

POLYVINYL ACETAL RESINS.—Kodak, Ltd. (July 15, '37.) 20691.

MANUFACTURE OF TITANIUM, ETC., in a cold-malleable form.—W. Kroll. (Germany, July 10, '37.) 20533; (Germany, Oct. 7, '37.) 20534.

METHOD FOR PREPARING AZO-COMPOUNDS.—Laboratoires Français de Chimiotherapie, and A. Girard. (Germany, July 12, '37.) 20658; (Germany, Oct. 20, '37.) 20659.

REFRACTORY ALLOY COMPOSITIONS.—C. A. Laise. (United States, July 13, '37.) 20696.

DYE-FORMING MATERIAL.—May Chemical Corporation. (United States, July 13, '37.) 20604.

PRODUCTION OF METALLIC MAGNESIUM.—Metallges, A.-G. (Germany, March 30.) 20453.

MANUFACTURE OF PRODUCTS with foaming, etc., properties.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (Holland, July 21, '37.) 20835; (Holland, Aug. 27, '37.) 20836.

MANUFACTURE OF PHENOLS, ETC.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (Holland, July 29, '37.) 20837.

ZINC ALLOYS.—National Smelting Co., Ltd. (Germany, July 12, '37.) 20259.

MANUFACTURE OF BASE EXCHANGE MATERIAL, ETC.—H. Nielsen, and Aktieselskabet Faerö-Kul. 20183.

CATALYTIC PROCESS FOR CONVERTING LIQUID, ETC., HYDROCARBONS INTO ANTI-KNOCK SPIRIT, ETC.—M. Nitescu. 20407.

REFINING OF HYDROCARBON OILS, ETC.—E. A. Ocon. 20593.

TREATMENT OF SCRAP IRON, ETC.—H. E. Partridge. 20403.

PRODUCTION OF HYDROCARBON PRODUCTS by destructive hydrogenation of solid carbonaceous materials.—H. E. Potts (Naamlooze Vennootschap Internationale Hydrogeneeringsoctrooien Maatschappij). 20447.

PURIFICATION OF SILICA SANDS, ETC.—Rekware Glass Syndicate, Ltd., and F. W. Adams. 20538.

APPARATUS FOR CARRYING OUT GRIGNARD REACTIONS in the cyclopentano-polyhydro-phenanthrene series.—Schering, A.-G. (Germany, July 7, '37.) 20179; (Germany, Nov. 15, '37.) 20180, 20181; (Germany, March 31.) 20182.

METHOD OF MANUFACTURING SULPHATE OF AMMONIA in large crystals.—Soc. Belge de l'Azote et des Produits Chimiques du Marly. (France, Feb. 25.) 20138.

MANUFACTURE OF ALLOYS, ETC.—Soc. d'Electrochimie d'Electrometallurgie et des Acieres Electriques d'Uzine. (France, July 22, '37.) 20825.

MANUFACTURE OF *a*-SUBSTITUTED SIDE CHAIN KETONES of the cyclopentanopoly-hydrophenanthrene series.—Soc. of Chemical Industry in Basle. (Switzerland, July 9, '37.) 20489; (Switzerland, June 14.) 20490.

MANUFACTURE OF AZO-DYESTUFFS.—Soc. of Chemical Industry in Basle. (Switzerland, July 10, '37.) 20491; (Switzerland, Sept. 18, '37.) 20492; (Switzerland, Jan. 6.) 20493; (Switzerland, April 27.) 20494; (Switzerland, June 20.) 20495.

MANUFACTURE OF DERIVATIVES of the saturated and unsaturated cyclopentanopolyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. (Switzerland, July 12, '37.) 20640; (Switzerland, June 9.) 20641.

MANUFACTURE OF *a*-DICARBONYL COMPOUNDS of the cyclopentanopolyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. (Switzerland, July 13, '37.) 20642; (Switzerland, June 1.) 20643.

SULPHURISED OILS.—Standard Oil Development Co. (United States, Oct. 8, '37.) 20596.

METHOD OF PREPARING ALYKLATED HYDROCARBONS from normal paraffinic hydrocarbons.—Texaco Development Corporation. (United States, July 24, '37.) 20123.

PRODUCTION OF MAGNETIC IRON OXIDE.—Abel Aide, Ltd., and H. E. Coley. 21014.

FERRO-MAGNETIC ALLOY.—T. Hamilton-Adams. 21125.

APPLICATION OF BASE EXCHANGERS to fertilisers, etc.—Auxiliaire des Chemins de Fer et de l'Industrie, and G. V. Austerweil. (France, Jan. 17.) 21182.

CATALYSTS.—W. W. Bamber. 20846.

MANUFACTURE OF BINDING-AGENTS.—Berginspektion Rüdersdorf Zweigniederlassung des Preuss Bergwerks-und Hütten, A.-G. (Germany, July 19, '37.) 21422.

PRODUCTION OF BASES FOR LACQUERS, ETC.—Binney and Smith Co. (United States, July 16, '37.) 21328; (United States, July 28, '37.) 21329.

SETTING-COMPOSITIONS containing magnesite.—British and International Flooring Co., Ltd. (Goetzl). 21430.

MANUFACTURE OF ADHESIVE SUBSTANCES, ETC.—A. Carpmael (I. G. Farbenindustrie.) (Feb. 15, '37.) 21116.

PREPARATION OF AZO-COLOURS ON THE FIBRE.—Chemical Works, formerly Sandoz. (Switzerland, July 15, '37.) 20914.

PREPARATION OF AMINO ALCOHOLS.—Chemical Works, formerly Sandoz. (Switzerland, July 21, '37.) 21595.

PROCESS FOR TANNING SKINS, ETC.—Chemische Fabrik J. A. Benckiser Ges. (Germany, July 20, '37.) 21608.

FORMATION OF CHROMIUM-CONTAINING LAYERS on ferrous surfaces. K. Daeves, G. Becker, and F. Steinberg. (Germany, July 21, '37.) 21593.

PREPARATION OF SODIUM MONOXIDE and sodium peroxide.—Deutsche Gold-und Silber-Scheideanstalt vorm. (Germany, July 28, '37.) 21466.

PRODUCTION OF GLYCERINE from fermented carbohydrate-containing materials.—Distillers Co., Ltd. (Germany, July 16, '37.) 21155.

STABILISATION OF PLASTIC POYYMERS of halogenobutadienes.—E. I. du Pont de Nemours and Co. (United States, July 17, '37.) 21300.

PRODUCTION OF FORMAMIDE DERIVATIVES.—E. I. du Pont de Nemours and Co. (United States, July 22, '37.) 21449.

PAINTS, ETC.—Ericsson Telephones, Ltd., A. Brookes, and S. H. D. Ward. 21235.

PRODUCTION OF DIELECTRICALLY HIGH QUALITY CERAMIC SUBSTANCES.—Fides Ges. für die Verwaltung und Verwertung von Gewerblichen Schutzrechten. (Germany, July 16, '37.) 21108.

PRODUCTION OF DIELECTRICALLY HIGH QUALITY TITANIUM DIOXIDE. Fides Ges. für die Verwaltung und Verwertung von Gewerblichen Schutzrechten. (Germany, July 16, '37.) 21109.

MANUFACTURE OF SECONDARY HIGHER ALCOHOLS.—J. G. Fife (Naamlooze Vennootschap de Bataafsche Petroleum Mattschappij). 21467.

UNSATURATED COMPOUNDS, ETC.—J. P. Fraser. 21566.

PREPARATION OF POLYMERISATION COMPOUNDS.—J. P. Fraser. 21567, 21568, 21569.

PREPARATION OF THERMOSETTING COMPOSITIONS.—J. P. Fraser. 21570.

MANUFACTURE OF AMINO KETONES.—J. R. Geigy, A.-G. (Switzerland, July 16, '37.) 20895.

HARDENING OF IRON BY CARBONISATION.—Gotthard Sachsenberg Zentral-Ges. (Germany, July 15, '37.) 20915.

PREVENTION OF CORROSION OF METALS.—J. Graham. 21343.

MANUFACTURE OF MONO-AZO-DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie.) 21043.

MANUFACTURE OF COLOURED MASSES OF POLYVINYL ACETALS.—W. W. Groves (I. G. Farbenindustrie.) 21044.

MANUFACTURE OF BASIC ESTERS.—W. W. Groves (I. G. Farbenindustrie.) 21045.

MANUFACTURE OF AZO-DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie.) 21046.

MANUFACTURE OF POLYMERIDES adapted for making shaped structures.—W. W. Groves (I. G. Farbenindustrie.) 21402.

MANUFACTURE OF POLYVINYL ACETALS having free carboxyl groups.—W. W. Groves (I. G. Farbenindustrie.) 21546.

PRODUCTION OF THERAPEUTICALLY-ACTIVE, ETC., PREPARATIONS.—H. C. Heide (Bickel). 21322.

MANUFACTURE OF REACTION PRODUCTS from aromatic hydrocarbons.—I. G. Farbenindustrie. (Germany, July 17, '37.) 20933.

MANUFACTURE OF DYESTUFFS of the anthraquinone series.—I. G. Farbenindustrie. (Germany, July 20, '37.) 21603.

AZO DYESTUFFS and manufacture, etc., thereof.—Imperial Chemical Industries, Ltd. (United States, July 14, '37.) 20930.

MANUFACTURE OF CHLORINE and alkali metal nitrates.—Imperial Chemical Industries, Ltd. (Holland, July 21, '37.) 21606.

MANUFACTURE OF SYNTHETIC RUBBER.—Istituto per lo Studio Della Gamma Sintetica. (Italy, July 19, '37.) 21459.

PRODUCTION OF YEAST.—C. J. Jackson, and Guinness, Son and Co., Ltd. 20871.

MANUFACTURE, ETC., OF LIQUID OR SOLID HYDROCARBONS, ETC.—G. W. Johnson (I. G. Farbenindustrie.) 21086.

PREPARATION OF AQUEOUS DISPERSIONS of highly polymerised organic substances.—G. W. Johnson (I. G. Farbenindustrie.) 21141.

ELECTROLYTIC RECOVERY OF NICKEL and chlorine from solutions containing nickel chloride.—G. W. Johnson (I. G. Farbenindustrie.) 21290.

MANUFACTURE, ETC., OF WATER-SOLUBLE DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie.) 21292.

RECOVERY OF PURIFIED PHENOLS from crude phenols.—G. W. Johnson (I. G. Farbenindustrie.) 21293.

MANUFACTURE, ETC., OF POLYAZO-DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie.) 21294.

MANUFACTURE OF DYESTUFFS of the anthraquinone series.—G. W. Johnson (I. G. Farbenindustrie.) 21426.

MANUFACTURE, ETC., OF BUTANE POLYCARBOXYLIC ACIDS.—G. W. Johnson (I. G. Farbenindustrie.) 21573.

MANUFACTURE, ETC., OF CONDENSATION PRODUCTS.—G. W. Johnson (I. G. Farbenindustrie.) 21574.

MANUFACTURE, ETC., OF DISAZO DYESTUFFS containing chromium. G. W. Johnson (I. G. Farbenindustrie.) 21572.

ACID-RESISTING STRUCTURES formed from synthetic resin.—A. Kath. 21307.

PREPARATION OF PARA-N-SUBSTITUTED DIARYL-SULPHOXIDES.—Laboratories Francais de Chimiotherapie, and A. Girard. (Germany, July 20, '37.) 21524; (Germany, July 20, '37.) 21525; (Germany, Sept. 23, '37.) 21526; (Germany, Oct. 6, '37.) 21527.

RUBBER COATING-COMPOSITIONS FOR VARNISHING FABRICS, ETC.—A. E. Lever, and P. Alexandre. 21400.

CATALYSTS, ETC.—A. M. G. M. Luyckx. (France, July 20, '37.) 21548.

MANUFACTURE OF MOTOR FUELS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, Aug. 2, '37.) 21103.

Specifications Open to Public Inspection

PROCESS FOR THE OBTAINING OF ADSORBENT, and decolorising agents.—H. A. A. L. Hofmann (neé Binder). Jan. 12, 1937. 27570/37.

POLYSULPHONATES OF AROMATIC POLYALKYLENE ETHERS.—Rohm and Haas Co. Jan. 12, 1937. 34074/37.

MANUFACTURE OF ORTHO-OXYAZO DYESTUFFS.—I. G. Farbenindustrie. Jan. 13, 1937. 34233/37.

PURIFICATION OF CELLULOSE ETHERS.—Dow Chemical Co. Jan. 18, 1937. 34509/37.

ANTI-CORROSIVE PIGMENTS and a process for their production.—R. S. Carreras. Jan. 15, 1937. 35135/37.

PROCESS FOR THE ELECTROLYTIC PRODUCTION OF METAL COATINGS on objects with a non-conducting surface.—Langbein-Pfanhauser-Werke, A.-G. Jan. 13, 1937. 36060/37.

MANUFACTURE OF MALEIC ANHYDRIDE.—National Aniline and Chemical Co., Inc. Jan. 13, 1937. 36169/37.....

AZO COMPOUNDS AND PROCESS FOR DYEING THEREWITH.—Kodak, Ltd. Jan. 14, 1937. 477/38.

METHOD OF PRODUCING PURIFIED TOXIFERINE, the active principle of calabash-curare.—E. Boehringer, A. Boehringer, J. Liebrecht, and I. Liebrecht (Geb. Boehringer.) Jan. 14, 1937. 919/38.

PROCESS FOR THE PREPARATION OF REDUCTION PRODUCTS OF OESTRONE etherified with a benzyl or with substituted benzyl groups.—Chinoin Gyogyszer es Vegyeszeti Termekek Gyara R.T. (Dr. Keresty and Dr. Wolf). Jan. 14, 1937. 935/38.

MANUFACTURE OF MORDANT AZO-DYESTUFFS.—Durand and Huguenin, A.-G. Jan. 15, 1937. 1023/38.

HARD METAL ALLOY.—Vereinigte Edelstahl, A.-G. Jan. 16, 1937. 1528/38.

MANUFACTURE AND USE OF COMPOUNDS of the betaine type.—Deutsche Hydrierwerke, A.-G. Jan. 16, 1937. 1553/38.

LUBRICANT, and process of making it.—Union Oil Co. of California. Jan. 18, 1937. 1556/38.

RECOVERY OF AROMATIC HYDROCARBONS.—I. G. Farbenindustrie. Jan. 18, 1937. 1661/38.

PROCESS FOR PRODUCING TANTALUM-CARBIDE and niobium-carbide, more particularly for the production of hard metal.—Vereinigte Edelstahl, A.-G. Jan. 18, 1937. 1692/38.

Specifications Accepted with Dates of Application

PRODUCTION OF CELLULOSE ESTERS.—Afag Finanzierungs, A.-G. Oct. 10, 1935. 488,707.

REPLACEMENT OF HALOGEN in cyclic halogen compounds by the cyano group.—G. W. Johnson (I. G. Farbenindustrie.) Nov. 5, 1936. 488,642.

WASHING COMPOUND.—A. A. Fowler, and R. M. Otis. Nov. 11, 1936. 488,647.

METHODS OF, AND APPARATUS FOR, THE TREATMENT OF RESINS.—R. Wirth, E. Willmeroth, and H. Behrisch. Nov. 12, 1935. 488,708.

METAL COMPOUNDS OF ASCORBIC ACID.—S. L. Ruskin. Nov. 13, 1936. (Convention date not granted.) 488,784.

MODIFYING THE PROPERTIES OF NATURAL OR ARTIFICIAL AMPHOTERIC COLLOIDS.—Aceta Ges. Nov. 13, 1935. (Samples furnished.) 488,783.

SURFACING ARTICLES WITH SYNTHETIC RESIN VENEERS.—A. S. Lewenstein. Nov. 13, 1936. 488,785.

PRODUCTION OF HYDROCARBON PRODUCTS of low boiling point by the treatment of carbonaceous materials at elevated temperatures. G. W. Johnson (I. G. Farbenindustrie.) Dec. 7, 1936. 488,651.

PRODUCTION OF VALUABLE HIGH BOILING PRODUCTS by the treatment of solid carbonaceous materials with hydrogenating gases.—H. E. Potts (International Hydrogenation Patents Co., Ltd.). Jan. 9, 1937. 488,856.

MANUFACTURE OF ACID-PROOF MORTAR.—W. W. Groves (I. G. Farbenindustrie.) Jan. 11, 1937. 488,992.

PROCESS FOR THE MANUFACTURE OF FERTILISERS.—C. S. Townsend. Jan. 11, 1937. 488,858.

HEAT-RESISTANT ALLOYS, and articles comprising the same.—Heraeus-Vacuumschmelze, A.-G. April 11, 1936. 488,926.

MANUFACTURE OF RED IRON OXIDE PIGMENTS.—A. P. Laurie. Jan. 12, 1937. 488,860.

RIPENING ALKALI CELLULOSE.—W. W. Groves (I. G. Farbenindustrie). Jan. 13, 1937. 488,793.

TREATMENT OF CELLULOSE DERIVATIVE FILAMENTS, YARNS, AND THE LIKE.—R. W. Moncrieff and F. B. Hill. Jan. 13, 1937. 488,794.

MANUFACTURE AND PRODUCTION OF COMPOUNDS OF THE ANTHRAQUINONE SERIES.—G. W. Johnson (I. G. Farbenindustrie.) Jan. 13, 1937. 488,863.

MANUFACTURE OF STABLE SYNTHETIC RUBBER.—A. Carpmael (I. G. Farbenindustrie.) Jan. 14, 1937. 488,866.

MANUFACTURE OF QUATERNARY AMMONIUM SALTS.—H. A. Piggott, and Imperial Chemical Industries, Ltd. Jan. 14, 1937. 488,869.

MANUFACTURE OF PLASTIC MASSES, and shaped articles therefrom. I. G. Farbenindustrie. Jan. 16, 1936. 488,997.

MANUFACTURE OF COATING-COMPOSITIONS.—J. G. Moore, E. Moores, and Imperial Chemical Industries, Ltd. Jan. 15, 1937. 488,937.

MANUFACTURE OF CHLORINATED RUBBER PRODUCTS.—E. Moores, A. P. Lowes, Imperial Chemical Industries, Ltd., and J. P. Baxter. Jan. 15, 1937. 488,938.

MANUFACTURE OF DERIVATIVES OF OESTRADIOL.—A. G. Bloxam (Soc. of Chemical Industry in Basle.) Jan. 16, 1937. 488,799.

MANUFACTURE AND TREATMENT OF FIBRES, yarns, fabrics, films, and like materials having a basis of an organic ester of cellulose. H. Dreyfus. Jan. 18, 1937. 488,946.

COLORATION OF ARTIFICIALLY PRODUCED OXIDE FILMS on aluminium and its alloys.—F. Hill, J. A. Radley, and Imperial Chemical Industries, Ltd. Jan. 18, 1937. 488,952.

PREPARATION OF TESTOSTERONE and its esters.—Laboratoires Francais de Chimiotherapie, A. Girard, and G. Sandulesco. Feb. 4, 1936. 488,801.

POLYMERISED NITRILES and processes of preparing the same.—Armour and Co. July 27, 1936. 488,808.

PURIFICATION OF COMBUSTIBLE GASES by washing with oils.—W. C. Holmes and Co., Ltd., D. M. Henshaw, and C. Cooper. June 23, 1937. 488,812.

ISOMERISATION AND DISMUTATION OF HYDROXY-KETO-COMPOUNDS having a cyclopentano-polyhydrophenanthrene skeleton.—Naamlooze Vennootschap Organon. June 27, 1936. 488,966.

PROCESS FOR THE MANUFACTURE OF POLYHYDRIC ALCOHOLS of the cyclopentanopolyhydrophenanthrene series.—Schering-Kahlbaum, A.-G. July 14, 1936. (Samples furnished.) 488,814.

MANUFACTURE OF MONOVINYLACETYLENE.—Dr. A. Wacker Ges Fur Elektrochemische Industrie Ges. July 17, 1936. 488,815.

HYDROLYSING CELLULOSIC BODIES with hydrogen halides.—E. Neu. Aug. 8, 1936. 488,897.

XANTHATION OF CELLULOSE.—L. Mellersh-Jackson (Brown Co.). Aug. 10, 1937. 488,761.

PRODUCTION OF VISCOSE.—L. Mellersh-Jackson. Sept. 7, 1937. 488,768.

PROCESS FOR THE MANUFACTURE OF COMPOUNDS OF THE ETIOCHOLANE SERIES.—W. P. Williams (Schering-Kahlbaum, A.-G.). Feb. 22, 1937. (Sample furnished.) 488,904.

MANUFACTURE OF COLLOIDAL UREA-ALDEHYDE CONDENSATION PRODUCTS.—Kalle and Co., A.-G. Oct. 1, 1936. (Samples furnished.) 488,686.

RESINOUS REACTION PRODUCTS OF INNER ETHERS and natural resin acids, and methods of making the same.—Atlas Powder Co. Dec. 28, 1936. 488,907.

VULCANISATION OF RUBBER.—Wingfoot Corporation. March 26, 1937. 488,691.

VULCANISATION OF RUBBER.—Wingfoot Corporation. March 30, 1937. 488,910.

RUBBER MIXTURES.—I. G. Farbenindustrie. Nov. 24, 1936. 488,692.

MANUFACTURE OF HYDANTOINS containing the sterol nucleus.—Soc. of Chemical Industry in Basle. Dec. 24, 1936. 488,829.

MANUFACTURE OF CARBOCYCLIC BASIC PRODUCTS.—W. W. Groves (I. G. Farbenindustrie.) Oct. 7, 1936. (Samples furnished.) 488,700.

ISOMERISATION AND DISMUTATION OF HYDROXY-KETO-COMPOUNDS having a cyclopentano-polyhydro-phenanthrene skeleton.—Naamlooze Vennootschap Organon. June 26, 1937. 488,987.

RUBBER AND SYNTHETIC RUBBER.—I. G. Farbenindustrie. March 19, 1937. 488,701.

PROCESS FOR THE MANUFACTURE OF ESTERS of β-acetamino butyric acid.—F. Hoffmann-La Roche and Co., A.-G. May 29, 1937. 488,702.

Weekly Prices of British Chemical Products

THERE is little alteration in the market position for industrial chemicals, nearly all departments reporting a quiet but steady trade. A fairly active interest continues to be maintained in a number of seasonal items and the movement in potash and soda products, if not very substantial, is satisfactory for the period. Formaldehyde has been receiving a better inquiry, but otherwise the market is without feature. There are no price changes of any importance and quotations throughout the market are on a steady basis. Conditions in the coal tar section remain more or less as reported last week. A fair general interest is displayed, but actual orders are few and for small quantities. Creosote is enjoying a steady but limited demand. The price of crude naphthalene, firelighter grade, is again lower, but elsewhere quotations are fairly well held.

MANCHESTER.—Prices of almost all descriptions of chemical products on the Manchester market during the past week have been on a steady to firm basis, with the non-ferrous metal compounds, in particular, a strong section. So far as trading is concerned, however, conditions this week have been quiet from the point of view of new bookings, and there is also room for improvement in the rate at which deliveries have been called for against contracts. Not much change for the better in either direction, however, is looked for until after the holidays. With regard to the tar products market conditions here also have been slack, though not much actual fresh weakness has developed.

Price Changes

Rises: Copper Sulphate (Manchester); Lead Acetate, white and brown (Manchester); Sodium Bicarbonate (Manchester).

Falls: Copper Sulphate; Sodium Bisulphate Powder, 60/62%; Cresylic Acid, 97/99%; Pale, 99/100%; Pale, 99/100% (Manchester); Naphthalene, crude, whizzed or hot pressed, and fire lighter quality.

GLASGOW.—Business in general chemicals has continued very quiet since our last report, both for home trade and export. Prices generally continue quite steady at about previous figures, with no special features to report.

General Chemicals

ACETONE.—**£45 to £47 per ton.**

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d Lancs. GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey, £18 10s. per ton, d/d U.K. Fine white, 98%, £17 per ton, d/d U.K.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8½d. per lb. d/d U.K.

ANTIMONY OXIDE.—**£68 per ton.**

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £16 10s. per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 5s. per ton in casks, special terms for contracts. SCOTLAND: **£9 per ton net ex store.**

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—**£6 10s. per ton f.o.r. London.**

CHARCOAL, LUMP.—**£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.**

CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10-cwt. drums (4-drum lots); 3½d. per lb. d/d station in 70-lb. cylinders (1-ton lots).

CHROMETAN.—Crystals, 2¾d. per lb.; liquor, £13 per ton d/d station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—10d. per lb., less 2½%; d/d U.K.

CHROMIC OXIDE.—11d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0¼d. per lb. MANCHESTER: 1s. 0¼d. SCOTLAND: B.P. crystals, 1s. 0¼d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£18 5s. per ton, less 2% in casks. MANCHESTER: £18 10s. per ton f.o.b. SCOTLAND: £18 15s. per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: **99%, £4 12s. per cwt. in 5-cwt. casks.**

FORMALDEHYDE.—**£20-£22 per ton.**

FORMIC ACID.—85%, in carboys, ton lots, **£42 to £47 per ton.**

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £4 2s. 6d. to £5 2s. 6d. per cwt. according to quantity; in drums, £3 15s. 0d. to £4 7s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 9d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £30; brown, £1 per ton less. MANCHESTER: White, £30 10s.; brown, £30.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£30 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £30 per ton, less 2½% carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £30 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, **£9 per ton, ex store.**

MAGNESIUM CHLORIDE.—SCOTLAND: £7 5s. per ton.

MAGNESIUM SULPHATE.—**Commercial, £5 10s. per ton, ex wharf.**

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 10d. per lb.; powder B.P., 6s. 0d.; bichloride B.P. (corros. sub.) 5s. 1d.; powder B.P. 4s. 9d.; chloride B.P. (calomel), 5s. 10d.; red oxide cryst. (red precip.), 6s. 11d.; levig. 6s. 5d.; yellow oxide B.P. 6s. 3d.; persulphate white B.P.C., 6s. 0d.; sulphide black (hyd. sulph. cum sulph. 50%), 5s. 11d. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: **Industrial 64 O.P., 1s. 9d. to 2s. 4d.**

NITRIC ACID.—Spot, £25 to £30 per ton according to strength, quantity and destination.

OXALIC ACID.—**£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.**

PARAFFIN WAX.—SCOTLAND: **3¼d. per lb.**

POTASH CAUSTIC.—Solid, £35 5s. to £40 per ton according to quantity, ex store; broken, £42 per ton. MANCHESTER: £38.

POTASSIUM CHLORATE.—**£36 7s. 6d. per ton. GLASGOW: 4¼d. per lb. MANCHESTER: £37 per ton.**

POTASSIUM DICHROMATE.—5¼d. per lb. carriage paid. SCOTLAND: 5¼d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 6s. 3d. per lb. in 7 lb. lots.

POTASSIUM NITRATE.—**Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.**

POTASSIUM PERMANGANATE.—LONDON: **9¼d. per lb.** SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 10¾d. to 11¼d.

POTASSIUM PRUSSIATE.—6¼d. per lb. SCOTLAND: 6¾d. net, in casks, ex store. MANCHESTER: Yellow, 6¼d. to 6¾d.

PRUSSIATE OF POTASH CRYSTALS.—In casks, 6¾d. per lb. net, ex store.

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. GLASGOW: **Large crystals, in casks, £37 10s.**

Salt Cake.—Unground, spot, £3 11s. per ton.
Soda Ash.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.
Soda, Caustic.—Solid, 76/77° spot, 13s. 10s. per ton d/d station. Scotland: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.
Soda Crystals.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2 cwt. bags.
Sodium Acetate.—£19-£20 per ton carriage paid North. Glasgow: £18 10s. per ton net ex store.
Sodium Bicarbonate.—Refined spot, £10 15s. per ton d/d station in bags. Glasgow: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. Manchester: £10 15s.
Sodium Bisulphite Powder.—60/62%, £14 10s. per ton d/d in 2-ton lots for home trade.
Sodium Carbonate Monohydrate.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.
Sodium Chlorate.—£27 10s. to £32 per ton. Glasgow: £1 11s. per cwt., minimum 3 cwt. lots.
Sodium Dichromate.—Crystals cake and powder 4¼d. per lb. net d/d U.K. with rebates for contracts.
Sodium Chromate.—4¼d. per lb. d/d U.K.
4d. per lb. Glasgow: 4¼d. net, carriage paid.
Sodium Hyposulphite.—Pea crystals, £15 5s. per ton for 2-ton lots; commercial, £11 5s. per ton. Manchester: Commercial, £11; photographic, £15 10s.
Sodium Metasilicate.—£14 5s. per ton, d/d U.K. in cwt. bags.
Sodium Nitrate.—Refined, £8 per ton for 6-ton lots d/d. Glasgow: £1 12s. 0d. per cwt. in 1-cwt kegs, net, ex store.
Sodium Nitrite.—£18 5s. per ton for ton lots.
Sodium Perborate.—10%, 9½d. per lb. d/d in 1-cwt. drums.
Sodium Phosphate.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £15 to £16 per ton delivered per ton lots.
Sodium Prussiate.—9d. per lb. for ton lots. Glasgow: 5d. to 5¾d. ex store. Manchester: 4¼d. to 5¼d.
Sodium Silicate.—£8 2s. 6d. per ton.
Sodium Sulphate (Glauber Salts).—£3 per ton d/d.
Sodium Sulphate (Salt Cake).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. Scotland: Ground quality, £3 5s. per ton d/d. Manchester: £3 12s. 6d.
Sodium Sulphide.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. Manchester: Concentrated solid, 60/62%, £11; commercial, £8 10s.
Sodium Sulphite.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.
Sulphur Precip.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
Sulphuric Acid.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.
Tartaric Acid.—1s. 1¼d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. Manchester: 1s. 1¼d. per lb. Glasgow: 1s. 1d. per lb., 5%, ex store.
Zinc Sulphate.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

Antimony Sulphide.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.
Arsenic Sulphide.—Yellow, 1s. 5d. to 1s. 7d. per lb.
Barytes.—£6 to £6 10s. per ton, according to quality.
Cadmium Sulphide.—3s. 11d. to 4s. 2d. per lb.
Carbon Black.—3½d. to 3 15/16d. per lb., ex store.
Carbon Disulphide.—£31 to £33 per ton, according to quantity, drums extra.
Carbon Tetrachloride.—£41 to £46 per ton, according to quantity, drums extra.
Chromium Oxide.—Green, 10½d. to 11d. per lb.
Diphenylguanidine.—2s. 2d. per lb.
India-rubber Substitutes.—White, 4¾d. to 5½d. per lb.; dark 3¾d. to 4½d. per lb.
Lamp Black.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.
Lead Hyposulphite.—9d. per lb.
Lithopone.—Spot, 30%, £16 10s. per ton, 2-ton lots d/d in bags.
Sulphur.—£9 to £9 5s. per ton. Sulphur precip. B.P., £55 to £60 per ton. Sulphur precip. comm., £50 to £55 per ton.
Sulphur Chloride.—5d. to 7d. per lb., according to quantity.
Vermilion.—Pale, or deep, 4s. 9d. per lb., 1-cwt. lots.
Zinc Sulphide.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

Ammonium Sulphate.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.
Calcium Cyanamide.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.
Nitro Chalk.—£7 10s. 6d. per ton up to June 30, 1938.
Sodium Nitrate.—£8 per ton for delivery up to June 30, 1938.
Concentrated Complete Fertilisers.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.
Ammonium Phosphate Fertilisers.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

Benzol.—At works, crude, 9½d. to 10d. per gal.; standard motor, 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 8d. to 1s. 8½d. Glasgow: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d. Manchester: Pure, 1s. 8d. per gal.; crude, 11d. to 1s. per gal.
Carbolic Acid.—Crystals, 7½d. to 8½d. per lb., small quantities would be dearer; Crude, 60's, 2s. to 2s. 3d.; dehydrated, 3s. to 3s. 3d. per gal. Manchester: Crystals, 7d. to 7¼d. per lb. f.o.b. in drums; crude, 2s. 3d. per gal.
Creosote.—Home trade, 4¾d. per gal., f.o.r. makers' works; exports 6¾d. to 6¾d. per gal., according to grade. Manchester: 4¾d. to 5¼d. Glasgow: B.S.I. Specification, 6d. to 6¼d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils 5¾d. to 6¼d.
Cresylic Acid.—97/99%, 1s. 9d. to 2s.; 99/100%, 2s. 6d. to 3s. per gal., according to specification; Pale, 99/100%, 2s. 1d. to 2s. 3d.; Dark, 95%, 1s. 7d. to 1s. 8d. per gal. Glasgow: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. Manchester: Pale, 99/100%, 2s. 4d.
Naphtha.—Solvent, 90/160, 1s. 6d. to 1s. 7d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1d. to 1s. 3d. per gal., naked at works, according to quantity. Glasgow: Crude, 6½d. to 7¼d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.
Naphthalene.—Crude, whizzed or hot pressed, £5 to £6 per ton; purified crystals, £11 10s. per ton in 2-cwt. bags. London: Fire lighter quality, £3 to £4 10s. per ton. Glasgow: Fire lighter, crude, £6 to £7 per ton (bags free). Manchester: Refined, £14 to £14 10s. per ton f.o.b.
Pitch.—Medium, soft, 33s. per ton, f.o.b. Manchester: 32s. 6d. f.o.b., East Coast. Glasgow: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.
Pyridine.—90/140%, 13s. 6d. to 15s. per gal.; 90/160%, 10s. 6d. to 13s. 3d. per gal.; 90/180%, 3s. 3d. to 4s. per gal. f.o.b. Glasgow: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. Manchester: 9s. to 10s. per gal.
Toluol.—90%, 1s. 10d. per gal.; pure, 2s. 2d. Glasgow: 90%, 120, 1s. 10d. to 2s. 1d. per gal.
Xylol.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 3d. to 2s. 3½d. Glasgow: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

Calcium Acetate.—Brown, £7 5s. to £9 15s. per ton; grey, £9 5s. to £9 15s. Manchester: Brown, £8 10s.; grey, £10.
Methyl Acetone.—40.50%, £35 to £40 per ton.
Wood Creosote.—Unrefined, 4d. to 6d. per gal., according to boiling range.
Wood Naphtha, Miscible.—3s. 3d. to 3s. 6d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.
Wood Tar.—£2 to £8 per ton, according to quality.

Intermediates and Dyes

Aniline Oil.—Spot, 8d. per lb., drums extra, d/d buyer's works.
Aniline Salts.—Spot, 8d. per lb. d/d buyer's works, casks free.
Benzidine, HCl.—2s. 7½d. per lb., 100% as base, in casks.
Benzoic Acid, 1914 B.P. (ex toluol).—1s. 11½d. per lb. d/d buyer's works.
***m*-Cresol 98/100%.**—1s. 8d. to 1s. 9d. per lb. in ton lots.
***o*-Cresol 30/31° C.**—6¼d. to 7¼d. per lb. in 1-ton lots.
***p*-Cresol, 34-5° C.**—1s. 7d. to 1s. 8d. per lb. in ton lots.
Dichloraniline.—2s. 1½d. to 2s. 5½d. per lb.
Dimethylaniline.—Spot, 1s. 7½d. per lb., package extra.
Dinitrobenzene.—8d. per lb.
Dinitrochlorbenzene, Solid.—£79 5s. per ton.
Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 11d.
Diphenylamine.—Spot, 2s. 2d. per lb., d/d buyer's works.
Gamma Acid, Spot, 4s. 4½d. per lb. 100% d/d buyer's works.
H Acid.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.
Naphthionic Acid.—1s. 10d. per lb.
***β*-Naphthol** —£97 per ton; flake, £94 8s. per ton.
***α*-Naphthylamine.**—Lumps, 1s. 1d. per lb.
***β*-Naphthylamine.**—Spot, 3s. per lb.; d/d buyer's works.
Neville and Winther's Acid.—Spot, 3s. 3½d. per lb. 100%.
***o*-Nitraniline.**—4s. 3½d per lb.
***m*-Nitraniline.**—Spot, 2s. 10d. per lb. d/d buyer's works.
***p*-Nitraniline.**—Spot, 1s. 10d. to 2s. 3½d. per lb. d/d buyer's works.
Nitrobenzene.—Spot, 4½d. to 4¾d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.
Nitronaphthalene.—10½d. per lb.; P.G., 1s. 0½d. per lb.
Sodium Naphthionate.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.
Sulphanilic Acid.—Spot, 8¾d. per lb. 100%, d/d buyer's works.
***o*-Toluidine.**—11d. per lb., in 8/10 cwt. drums, drums extra.
***p*-Toluidine.**—1s. 11d. per lb., in casks.
***m*-Xylidine Acetate.**—4s. 8d. per lb., 100%.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

FRANK YOUNG AND CO., LTD., Manchester, bleachers, dyers, etc. (M., 30/7/38.) July 19, £125 debenture, to C. T. Brown, Port St. Mary (I.O.M.); general charge. *£2,000. Dec. 31, 1937.

KOPPERS COKE OVEN CO., LTD., Sheffield. (M., 30/7/38.) July 12, £10,000 debenture, to Branch Nominees, Ltd.; general charge. *£20,000. Dec. 28, 1937.

LONABARC COLOUR WORKS, LTD., London, S.E. (M., 30/7/38.) July 18, £500 debentures, part of £2,000 already registered.

STOCKTON CHEMICAL ENGINEERS AND RILEY BOILERS, LTD. (M., 30/7/38.) July 16, £26,000 debentures; general charge. *£15,000. Jan. 14, 1938.

W. A. MITCHELL AND SMITH, LTD., Mitcham, chemical manufacturers, etc. (M., 30/7/38.) July 13, £2,500 mortgage to E. G. Kemer, Mitcham; charged on land at Mitcham.

County Court Judgment

COLLINS, Ernest Geo., Ozopine Wharf, Portslade, soap manufacturer. (C.C., 30/7/38.) £28 12s. 5d. May 31.

Partnership Dissolved

AMBORA SOAP WORKS, (John Howard Frere and William Richard Warner), soap manufacturers, 393 New North Road, London, under the style or firm of Ambora Soap Works, by mutual consent, June 30, 1938.

Receiverships

ACME CHEMICAL COMPANY, LTD., Vale Road East, Tonbridge. C. J. Maples, F.C.A., 45 London Wall, E.C.2, was appointed receiver on July 12, 1938, under powers contained in third mortgage debentures dated January 19, 1938.

New Companies Registered

The Egyption Desert Petroleum Co., Ltd. 342,672; the **Texas Mediterranean Petroleum Co., Ltd.** 342,694; and the **Levant Petroleum Co., Ltd.** 342,684, were also registered as private companies, the capital in each case being £5,000 in £1 shares, and the objects and other particulars similar to the above, except that the subscribers to the two last named are Roy Lebkicher, 6 Lothbury, E.C.; Christopher H. Harmer.

The California Mediterranean Petroleum Company. 342,665.—Private company. Capital £5,000 in 5,000 shares of £1 each. To carry on the business of prospecting for, producing, transporting, storing, refining and dealing in petroleum and other mineral oils, natural gas, asphalt, ozokerite and hydrocarbons and their products and bye-products; also the business of shippers, forwarding agents, etc. Subscribers: Lloyd Nelson Hamilton, 6 Lothbury, E.C.2; Hamilton R. Ballantyne.

The Hemsworth and United Kingdom Coke Oven Co., Ltd. 342,515. Private company. Capital £350,000 in 3,500 shares of £100 each. To carry on the business of manufacturers of and dealers in gas, coke, patent fuels, tar, pitch, oils, chemicals, dyes, manures, bye-products, refuse or residue, constructors, retorts, apparatus and machinery, ship and barge owners, carriers, etc., and to adopt agreements (a) with the South Kirby Featherstone and Hemsworth Collieries, Ltd., and (b) with the United Kingdom Gas Corporation, Ltd. Subscribers: The Rt. Hon. Earl of Lindsay, Kilcouquhar, Fife; Bruce Ottley.

P. J. Mereine, Ltd. 342,846.—Private company. Capital £100 in 100 shares of £1 each. To adopt an agreement with P. J. Mereine for the purchase of the business of Visk Products Co., and P. J. Mereine, together with certain lands and other property belonging thereto, and to carry on the business of merchants in and importers and manufacturers of oils, paints, pigments and varnishes, manufacturers of and dealers in pharmaceutical and other preparations, etc. Directors: Philip J. Mereine, 67 Priory Road, West Hampstead, N.W.6; Henry B. Cronshaw. Registered Office: Finsbury Court, Finsbury Pavement, E.C.2.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British India.—The Director-General, India Store Department, Belvedere Road, Lambeth, London, S.E.1, invites tenders for 4,200 lb. bismuthi carbonas, 930 lb. bismuthi subnitras and 425 lb. bismuthi salicylas (all B.P.). Tenders due August 12, 1938. Forms of tender obtainable from the above at a fee of 5s.

Switzerland.—A well-established agent at Lucerne wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of druggists' supplies for the whole of Switzerland. (Ref. No. 77.)

Chemical and Allied Stocks and Shares

HOLIDAY influences have reduced the volume of business in the industrial and other sections of the Stock Exchange, and the tendency has been for share values to move to rather lower levels despite the strength of Wall Street which in recent weeks has been the chief factor influencing market sentiment. The belief is now gaining ground that even if industrial conditions in the United States show recovery before the turn of the year a moderate period will have to elapse before this benefits international trade and the trade outlook generally.

Movements in shares of companies identified with the chemical and allied trades were influenced mainly by the less cheerful tendency of markets generally, but in some cases prices are slightly higher as compared with a week ago. Distillers, for instance, have improved 1s. to 99s., the statements at the recent meeting having continued to influence sentiment. United Molasses, which were affected by encouraging dividend estimates in the market, are 10½d. better at 23s. 3d., and Borax Consolidated deferred shares are unchanged at 26s. 6d. at the time of writing. Fison Packard and Prentice remained rather more active around 34s. on the assumption that the continued growth of the business is increasing earnings. United Glass Bottle at 48s. 9d. are within 3d. of the price current a week ago, and Associated Portland Cement are unchanged at 81s. 10½d. British Plaster Board, which came in for attention on consideration of the statements at the recent meetings are 1s. 9d. better at 28s.

General Refractories remained at 14s., the interim dividend is expected to be declared next month or early in September. Imperial Smelting at 11s. 10½d. were little changed on the week. Swedish Match held their recent rise to 26s., while International Nickel were higher at $51⅜ in sympathy with the trend of Wall Street markets. Boots Pure Drug are 42s. 4½d., or virtually the same as a week ago, but Timothy Whites and Taylors were moderately lower at 25s. 9d. Sangers at 23s. 4½d. have more than held their recent rise and British Drug Houses were more active, although slightly lower at 21s. 9d. Beechams Pills deferred shares have reacted further to 56s. 3d.

Lever and Unilever at 38s. 6d. have made a slightly higher price and British Match at 33s. are little changed. Courtaulds at 28s. 6d. are slightly better on the week, and shares of other textile shares were inclined to be a steadier market. Calico Printers, Fine Cotton Spinners and Lancashire Cotton Corporation ordinary were slightly better on balance.

B. Laporte were maintained at 87s. 6d., and Greeff-Chemicals Holdings 5s. units at 6s. 6d., while Monsanto Chemicals 5½ per cent. preference were again 22s. 6d., and United Premier Oil and Cake ordinary were little changed at 7s. 1½d. British Industrial Plastics continued a more active market and these 2s. shares are quoted at 2s. 9d. at the time of writing. On the other hand, Erinoid ordinary shares were unchanged at 3s. 6d. Triplex Glass were affected by reports of increased competition in the safety glass trade and have declined sharply to 34s. 6d. Results of this company are due next month. Lancegaye Safety Glass at 3s. 6d., and British Indestructo Glass shares at 2s. 9d. are slightly lower on balance. Forster's Glass shares were quoted at 18s. 9d., and Kay Glassworks at 55s. British Aluminium have declined to 48s. 9d. the "cut" in the price of aluminium having led to divergent views of dividend prospects.

Oil shares have been rather more active, but Anglo-Iranian, "Shell" and other leading shares in this section did not keep best prices, sentiment being affected mainly by the general trend of markets. The annual report of Mexican Eagle Oil is expected shortly and is being awaited with more than usual interest.